Sanskrit Nominal Stem Gradation without Morphomes
Brent de Chene, Waseda University (emeritus)

1 Introduction

In a recent review article, Spencer (2019: 254), commenting on Embick and Halle's (2005) rejection of the idea of the "morphomic stem", tasks those authors with having failed to come to terms with the analysis of Sanskrit nominal stem alternations in chapter 6 of Stump 2001:

> "However, what they crucially fail to do is provide any kind of response to Stump's very detailed analysis of the Sanskrit morphomic stem system, ... That discussion shows that in Sanskrit it is necessary to define stems as morphophonological objects (i.e. the Vṛddhi, Guṇa, and Zero grade ablaut series) but also as purely morphomic objects ('Strong', 'Weak', 'Weakest' stems), defined in terms of a very complex distribution across paradigms."

Spencer's claim (for which see also Spencer 2016: 210) is made in the context of a critical evaluation of Embick 2015 and of Distributed Morphology (DM) more generally, and he claims that DM is counterexemplified by the Sanskrit data and Stump's account of it. This claim is somewhat counterintuitive: Stump's chapter 6 is entitled "Stem alternations", and its topic thus falls squarely within the domain of morphophonology. DM, on the other hand, while it can be assumed to inherit the generative phonological tradition, is primarily a theory of morphotactics, a topic on which Stump is silent. Below, therefore, in providing a reanalysis of Stump's data, I will set aside Spencer's claims about DM. My aim will be to show that, contrary to the assertions of Stump and Spencer, Sanskrit nominal stem gradation, when properly understood, provides no support for the concept of the morpheme or for an autonomous field of morphology independent of both morphosyntax and morphophonology. Before beginning, I note that my usage will differ slightly from that of Stump with regard to the term *stem*. I will use that term to refer to the phonological (i.e. underlying) form of a lexeme or to the lexeme itself, and not to a particular realization thereof. Thus, where Stump (2001: 169) says that a lexeme may exhibit a variety of stems, I will say that a stem may exhibit a variety of stem alternants or allomorphs.

2 Accent and ablaut in Sanskrit nouns and adjectives

In proposing a reanalysis of Stump's Sanskrit data, it is important to begin with a characterization of the set of lexical items involved. Stump (2001: 185-186) identifies an alternation $\bar{a} \sim a \sim \emptyset$ and calls stems that display it "gradational". I will adopt that term, taking (potential) eligibility for the $a \sim \emptyset$ alternation, which I will claim to be governed by a rule of syncope, as criterial for its application. Because syncope will tend to produce violations of syllable-structure constraints, it is effectively limited to cases in which the vowel undergoing syncope is followed by a sonorant consonant, in practice *r* or *n*, that is capable of serving as a syllable nucleus when situated between consonants (syllabic *r* remains as such, while syllabic *n* becomes *a*). Abstracting away from vowel length, members of the set of gradational stems (gradational nominals) thus have the form XCaR(C)-, where R = *r* or *n*; apart from a few root nouns, they are formed with suffixes of the shape -(C)aR(C)-. (1) below shows the four subcases of this formula and the suffix shapes that instantiate them; note that vowel-initial suffixes must be added to a consonant-final base to produce a gradational stem.

(1) a. -aR-   -an-
     b. -CaR-   -van-, -man-, -tar-
     c. -aRC-   -ant-, añc-
     d. -CaRC-   -vant-, -mant-, -yans-, -vans-

In cases (1a) and (1b), where R is final in the suffix, whether or not R vocalizes (becomes syllabic) after syncope of *a* will depend on whether the ending begins with a vowel or a consonant. In cases (1c) and (1d), on the other hand, R will vocalize after syncope regardless of whether the ending is V-initial or C-initial, assuming again in (c) that the suffix is added to a consonant-final base. Stump also discusses certain alternating stems that are not gradational, notably adjectives in -*in*-; while I touch briefly on those below, I exclude them from the scope of the proposed analysis.

As is well known, Sanskrit nominal and adjectival inflection distinguishes masculine, feminine, and neuter gender (abbreviated below as m., f., and n. in glosses and as M, F, and N otherwise); singular, dual, and plural number (abbreviated as Sg, Du, and Pl); and the eight cases Voc(ative), Nom(inative), Acc(usative), Inst(rumental), Dat(ive), Abl(ative), Gen(itive), and Loc(ative). In discussing Sanskrit noun paradigms, I will make use of a feature [±Oblique] that groups the "direct" cases Nom and Acc (Jakobson 1958 [1984]: 110; see also Stump 2001: 178) together as [–Oblique] and the remaining cases together as [+Oblique]. I will take number to be represented by two binary features [±Sg] and [±Pl], but will not decompose case and gender categories, using the above abbreviations without modification to refer to those categories. When not speaking of particular inflected forms (paradigmatic slots), however, I will write out category names without capitalization. Vocatives, taken to be [–Oblique], will be recorded only when they differ segmentally from nominatives; this occurs only in forms that are masculine and singular.

2.1 Stems ending in *nt* (root stems and suffixes -*ant*-, -*mant*-, -*vant*-)

Consider first the Vedic paradigm of *dant*- 'tooth' in Table 1 (Szemerényi 1996: 166; see also Whitney 1889: 149, Macdonell 1916: 458); dual forms have been constructed on the pattern of participles in -*ant*- (for the stem allomorphs) and other monosyllabic consonant-stems (for the accent). In the table, a broken horizontal line separates forms with the stem allomorph *dán(t)*- from forms with the allomorph *dat*-, where the *a* of the latter represents vocalization of syllabic *n* after syncope of the stem vowel. Stem-final *t* is lost in the Nom Sg as the result of a rule that deletes all but the first of a sequence of word-final consonants (Whitney 1889: 51; below, "Final Cluster Reduction") and assimilates in voicing to a following obstruent. In the table, syncretic forms appear only once each; in the dual, for example, *dánt-āu* is the Nom/Acc form, *dad-bhyā́m* the Inst/Dat/Abl form, and *dat-ós* the Gen/Loc form.

Table 1   Paradigm of *dant*- (m.) 'tooth'

	Sg	Du	Pl
Nom	dán	dánt-āu	dánt-as
Acc	dánt-am		dat-ás
Inst	dat-ā́		dad-bhís
Dat	dat-é	dad-bhyā́m	dad-bhyás
Abl	dat-ás		
Gen		dat-ós	dat-ā́m
Loc	dat-í		dat-sú

Forms with *dán(t)*- and *dat*- represent, respectively, those case/number forms known in Sanskrit and Indo-European linguistics as "strong" and "weak". For the masculine paradigm in Table 1, the set S of strong forms and the set W of weak forms can be expressed as in (2).

(2) a. S = Nom $\vee$ [Acc$\wedge$[+Sg]]
    b. W = [+Obl] $\vee$ [Acc$\wedge$[+Pl]]

We may note that the status of the accusative plural as a weak case form, which complicates the formulae in (2), is probably a secondary development in Indo-Iranian (Hock 1974); Whitney (1889: 146) notes that accusative plurals retain stem accent for roughly two-thirds of all monosyllabic stems.

A striking feature of the paradigm of Table 1 is the correlation of the strong/weak distinction with the position of accent, with strong forms having stem accent and weak forms having suffixal accent. Before proceeding, let us review the rudiments of Sanskrit inflectional accentuation, following the treatment in Kiparsky 1973.

Sanskrit noun stems can be divided into those that have a lexically specified accent on one of their syllables and those that have no lexically specified accent. Accented nouns show no accentual alternations; the lexically specified syllable is accented throughout the paradigm. In contrast, when a stem has no lexical accent, its inflected forms are assigned accent by rule depending on their strong or weak status. If the unaccented noun is athematic, as in the case of *dant*- 'tooth' above,

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its weak forms are accented on the post-stem vowel (i.e. the first vowel of the suffix), and its strong forms are accented on the pre-suffix vowel (i.e. the last vowel of the stem). These generalizations are naturally accounted for by the rules (3) below (adapted from Kiparsky 1973: 804), where brackets labeled "Case" enclose a case suffix, the right bracket "$_N$]" marks the right edge of a noun stem, and S and W, standing in for morphosyntactic feature specifications, are as in (2).

(3) a.　$V \rightarrow [+acc] \ / \ \_\_ C_{0 \ N}] \ [_{Case} \ S]$
　　b.　$V \rightarrow [+acc] \ / \ [_{Case} \ C_0 \ \_\_ \ W]$

If an unaccented noun is thematic, on the other hand, and if the thematic vowel is treated as a separate morpheme, rules (3) entail that the thematic vowel will be accented throughout the paradigm, given that that vowel is both the pre-suffix vowel and the post-stem vowel (Kiparsky 1973: 809). The status of (3a) and (3b) as phonological rules, it should be clear, is not compromised by the complex morphosyntactic conditioning that they involve (on this issue, see Kiparsky 1996).

　　Vocative forms stand apart from the rest of the paradigm accentually in that they are accentless except phrase-initially, where they show accent on their initial syllable. I will assume that the accent of vocatives, whether lexical or assigned by rule (3a), undergoes deletion and is replaced phrase-initially by a floating high tone that docks onto the first syllable of a phrase-initial word if that word is accentless and onto its accented syllable otherwise (Gunkel 2017). Following convention, I will write this phrase-level initial accent on vocative singular masculine forms that are cited because they are segmentally distinct from the corresponding nominatives. Vocative duals and plurals and vocative singulars neuter, which always coincide segmentally with nominatives, will not be cited separately even when they differ from nominatives accentually.

　　We should note that it is also possible to assume that suffixes as well as stems may be accented underlyingly, and to derive surface accentual patterns from the interaction of the lexically specified accents of stem and suffix (Kiparsky and Halle 1977, Halle and Kiparsky 1981, and much subsequent work). Under this approach, the morphosyntactic conditioning of rules (3) becomes a matter of lexical representation; in particular, the suffixes of weak forms are accented, while those of strong forms are not. Because accent is not our primary concern here (and is not systematically treated by Stump (2001)), I will set this issue aside, but will note that certain properties of Sanskrit accent that receive a principled explanation under rules (3) are simply stipulated under the representational account. This is true, in particular, for the fact that a suffixal accent always falls on the first syllable of the suffix, as shown by polysyllabic verbal suffixes (Kiparsky 1973: 810); the fact that unaccented thematic stems uniformly show accent on the thematic vowel, which follows as a theorem from rules (3), but will be the result of the accented status of the thematic vowel under the representational account; and the close correlation of suffixal versus stem accent with the feature [±Oblique].

　　Because the forms of Table 1 that undergo syncope of the stem vowel are precisely those with suffixal accent, a syncope rule for that paradigm could be very simple, deleting the vowel *a* in the relevant interconsonantal environment when the following vowel bears the accent. In this context, consider now the paradigm of the present participle *bháv-ant-* 'being' (masculine forms; Whitney 1889: 164-165).

Table 2　Paradigm of *bhávant-* 'being' (masculine forms)

	Sg	Du	Pl
Nom	bhávan	bhávant-āu	bhávant-as
Acc	bhávant-am		bhávat-as
Inst	bhávat-ā		bhávad-bhis
Dat	bhávat-e	bhávad-bhyām	bhávad-bhyas
Abl	bhávat-as		
Gen		bhávat-os	bhávat-ām
Loc	bhávat-i		bhávat-su

In the paradigm of *bhávant-*, accent falls uniformly on the initial syllable. That stem nevertheless displays the same vowel-zero alternation as *dant-* 'tooth': the vowel of the stem-final syllable appears in strong forms, but is absent in weak forms, the observed *a* being the result of post-syncope vocalization of *n*. Syncope in the paradigm of *bhávant-*, then, rather than

being conditioned by a following accent, targets a stem-final vowel in the morphosyntactic environment of rule (3b):

(4)   a → Ø / C __ R(C) $_N$] [$_{Case}$ W]

As in the case of rules (3), the status of (4) as a phonological rule is not compromised by its morphosyntactic conditioning.

   The feminine forms corresponding to the masculines of Table 2 are constructed on a stem *bháv-ant-ī-* (Whitney 1889: 166) and thus lie outside the paradigm of *bhávant-* itself (in other cases, the feminines for a participle V-*ant-* are formed on V-*at-ī-* rather than V-*ant-ī-*). Neuter forms for V-*ant-* are distinct from masculines only in the Voc/Nom/Acc, for which a single form exists in each number. The endings are Sg -Ø (attached to the weak stem alternant in -*at*-), Du -*ī* (with variation between attachment to the strong and attachment to the weak stem alternant (Whitney 1889: 163)), and Pl -*i* (generally attached to the strong stem alternant in -*ant*-); for *bhávant-*, the forms are Sg *bhávat*, Du *bhávant-ī*, and Pl *bhávant-i*. The status of the first of those as a weak case form requires complication of the environment W given in (2b) above by the addition of the disjunct [[–Obl]∧[+Sg]∧N] ([[–Obl]∧[–Pl]∧N] when the Voc/Nom/Acc Du N is also a weak form); [Acc∧[+Pl]] must in addition be replaced by [Acc∧[+Pl]∧M].

   Participles in -*ant*- with mobile rather than fixed accent show an accentual alternation distinct from that of *dant-* 'tooth' in Table 1, an alternation that is characteristic of polysyllabic consonant-stems with mobile accent in general (Whitney 1889: 110). This is illustrated with the paradigm of *ad-ant-* 'eating' (masculine forms) in Table 3.

Table 3   Paradigm of *adant-* 'eating' (masculine forms)

	Sg	Du	Pl
Nom	adán	adánt-āu	adánt-as
Acc	adánt-am		adat-ás
Inst	adat-ā́		adád-bhis
Dat	adat-é	adád-bhyām	adád-bhyas
Abl	adat-ás		
Gen		adat-ós	adat-ā́m
Loc	adat-í		adát-su

Segmentally, participial -*ant*- alternates in the same way in the paradigm of *adant-* as in the paradigm of *bhavant-* (Table 2). Accentually, *adant-* shows accent on the stem-final syllable in strong forms, as expected for a stem with mobile accent. In weak forms, however, it shows accent on the ending-initial syllable only when the ending begins with a vowel; in forms whose ending begins with a consonant (-*bhyām*, -*bhis*, -*bhyas*, -*su*), accent appears instead on the stem-final syllable. For stems ending in sonorant consonants, it would be possible to tie this accentual alternation in weak forms to the fact that after syncope, the deleted syllable nucleus is reconstituted by vocalization of the sonorant precisely before a consonant-initial ending (see Kiparsky 2009: 8). In participial -*ant*-, however, the suffix-final *t* means that the syllable nucleus lost to syncope will be reconstituted by vocalization regardless of the initial segment of the ending. I will assume that, in the paradigm of polysyllabic stems, the accent of weak forms with consonant-initial suffixes is due to a morphologically conditioned rule retracting accent from the suffix to the stem, but will leave that rule unformulated here.

Table 4   Paradigm of *bhágavant-* 'fortunate' (masculine forms)

	Sg	Du	Pl
Voc	bhága-van		bhága-vant-as
Nom	bhága-vān	bhága-vant-āu	
Acc	bhága-vant-am		bhága-vat-as
Inst	bhága-vat-ā		bhága-vad-bhis
Dat	bhága-vat-e	bhága-vad-bhyām	bhága-vad-bhyas
Abl	bhága-vat-as		
Gen		bhága-vat-os	bhága-vat-ām
Loc	bhága-vat-i		bhága-vat-su

Closely parallel to the inflection of participles in *-ant-* are possessive adjectives in *-mant-* and *-vant-* (*paśu-mánt-* 'possessing cattle', *bhága-vant-* 'fortunate'), which differ from the participles only in lengthening the stem vowel in the Nom Sg M (Whitney 1889: 167). Adjectives in *-mant-* and *-vant-* may be accented on either syllable of a bisyllabic base or, as in the case of *paśumánt-*, on the suffix. Table 4 shows the masculine paradigm of *bhágavant-*, the first we have seen to display a segmental distinction between the vocative and nominative singular. Comparison of the strong forms of Table 4 makes it clear that, regarding length of the stem vowel, it is the nominative singular that is the exceptional case.

2.2 *n*-stems and *r*-stems (suffixes *-an-*, *-man-*, *-van-*, *-tar-*)

Consider next the paradigm of *rā́j-ān-* 'king' (Whitney 1889: 157-158), which, like the paradigms of Tables 1 through 4 above, shows syncope of its stem-final vowel in weak forms. *rā́jān-* is transparently based on the root *rā́j-* 'to rule', but for many other stems apparently derived with suffixes *-an-*, *-man-*, or *-van-*, the morphological affiliation of the base is less clear, and I will generally present such stems as unsegmented.

Table 5   Paradigm of *rā́jān-* (m.) 'king'

	Sg	Du	Pl
Voc	rā́jan		rā́jān-as
Nom	rā́jā	rā́jān-āu	
Acc	rā́jān-am		rā́jñ-as
Inst	rā́jñ-ā		rā́ja-bhis
Dat	rā́jñ-e	rā́ja-bhyām	rā́ja-bhyas
Abl	rā́jñ-as		rā́jñ-ām
Gen		rā́jñ-os	
Loc	rā́jñ-i		rā́ja-su

rā́jān- shows accent on the root throughout its paradigm, but a stem like *mūrdhān-* (m.) 'head' (Whitney 1889: 158, Kiparsky 1973: 816) is parallel except for showing the polysyllabic accentual mobility of *adant-* 'eating'.

Like *bhágavant-*, *rā́jān-* shows a segmental distinction between the vocative and nominative singular. In contrast to the case of *bhágavant-*, however, comparison of the strong forms of *rā́jān-* shows that it is the vocative singular that is exceptional with respect to length of the stem vowel. In fact, shortening of the stem vowel in vocative singular forms appears to be general across the declensional system. We will see the same phenomenon in Voc Sg *dā́tar* 'giver!' (stem *dātā́r-*) below; similarly, the stems *devī́-* 'goddess' and *vadhū́-* 'woman' appear with long vowels before any consonant-initial ending, but their vocative singulars are *dévi* and *vádhu* (Whitney 1889:133). I will thus assume that there is a rule shortening vowels in the environment __ C$_0$ N] [$_{Case}$ Voc] (below, "Vocative Shortening") that is responsible for the short stem vowel of *rā́jan*. Nom Sg *rā́jā* displays the result of another rule, one that deletes a word-final sonorant in masculines and feminines with compensatory lengthening of the preceding vowel (*yoṣan-* (f.) 'young woman' (Macdonell 1916: 68), Nom Sg *yoṣā́*; for the historical background of this alternation, see Szemerényi 1996: 115-117). A further difference between the paradigm of *rā́jān-* and those of the *nt*-stems we saw in section 2.1 is that, after syncope, the *n* of *rā́jān-* is interconsonantal only before a consonant-initial ending. Before a vowel, it surfaces as a syllable onset, assimilated in place of articulation to the preceding palatal. Finally, the Loc Sg *rā́jñi* of *rā́jān-* has an alternative form *rā́jani* that has failed to undergo syncope of the stem vowel.

The major problem of analysis that the paradigm of *rā́jān-* poses, however, arises from yet another difference from the paradigms of Tables 1 through 4, the fact that the stem vowel that alternates with zero in *rā́jān-* is long *ā* rather than short *a*. It is customary to assume that that vowel is underlyingly short (guṇa grade; see e.g. Stump 2001: 191-192) and undergoes lengthening in strong case forms. But there can be no general lengthening rule for strong forms: across the set of gradational nominals, stems displaying long stem vowels in strong forms and stems displaying short stem vowels in strong forms contrast. Concretely, a lengthening rule for strong forms would have to apply to agent nouns in *-tar-* but not to kinship nouns in *-tar-*; to most stems in *-an-*, *-man-*, and *-van-* but not all of them (see Macdonell 1916: 68-69); and to perfect participles in *-vans-* and comparatives in *-yans-* but not to present participles in *-ant-* or possessive adjectives

in -*vant*- and -*mant*-. It seems reasonable to conclude, then, that whether or not stem vowels are long in strong forms of gradational nominals is a matter of the lexical representation of individual suffixes or individual stems. Contrast between long-vowel strong forms and short-vowel strong forms is illustrated in Tables 6 and 7 by the paradigms of *dā-tār*- 'giver' and *pi-tar*- 'father', both of which show the polysyllabic pattern of accentual mobility.

<table>
<tr><td colspan="4">Table 6 Paradigm of *dātār*- (m.) 'giver'</td></tr>
<tr><td></td><td>Sg</td><td>Du</td><td>Pl</td></tr>
<tr><td>Voc</td><td>dā́tar</td><td rowspan="2">dātā́r-āu</td><td rowspan="2">dātā́r-as</td></tr>
<tr><td>Nom</td><td>dātā́</td></tr>
<tr><td>Acc</td><td>dātā́r-am</td><td></td><td>dātṝ́-n</td></tr>
<tr><td>Inst</td><td>dātr-ā́</td><td rowspan="2">dātṝ́-bhyām</td><td>dātṝ́-bhis</td></tr>
<tr><td>Dat</td><td>dātr-é</td><td rowspan="2">dātṝ́-bhyas</td></tr>
<tr><td>Abl</td><td rowspan="2">dātúr</td></tr>
<tr><td>Gen</td><td rowspan="2">dātr-ós</td><td>dātṝ-ṇā́m</td></tr>
<tr><td>Loc</td><td>dātári</td><td>dātṝ́-ṣu</td></tr>
</table>

<table>
<tr><td colspan="4">Table 7 Paradigm of *pitar*- (m.) 'father'</td></tr>
<tr><td></td><td>Sg</td><td>Du</td><td>Pl</td></tr>
<tr><td>Voc</td><td>pítar</td><td rowspan="2">pitár-āu</td><td rowspan="2">pitár-as</td></tr>
<tr><td>Nom</td><td>pitā́</td></tr>
<tr><td>Acc</td><td>pitár-am</td><td></td><td>pitṝ́-n</td></tr>
<tr><td>Inst</td><td>pitr-ā́</td><td rowspan="2">pitṝ́-bhyām</td><td>pitṝ́-bhis</td></tr>
<tr><td>Dat</td><td>pitr-é</td><td rowspan="2">pitṝ́-bhyas</td></tr>
<tr><td>Abl</td><td rowspan="2">pitúr</td></tr>
<tr><td>Gen</td><td rowspan="2">pitr-ós</td><td>pitṝ-ṇā́m</td></tr>
<tr><td>Loc</td><td>pitári</td><td>pitṝ́-ṣu</td></tr>
</table>

Several details of Tables 6–7 require comment, but what is most important for our purposes is that while the inflection of weak forms is identical in the two paradigms, the strong forms other than the vocative and nominative singular show a long stem vowel in the paradigm of *dātār*-, but a short stem vowel in the paradigm of *pitar*-. The natural inference is that the phonological forms of the two stems, as anticipated in our transcriptions, are /dātār/ and /pitar/.

The paradigms of *dātār*- and *pitar*- include several forms that are segmentally and/or accentually unexpected in terms of what we have seen above. Abl/Gen Sg *dātúr*, first of all, appears to have no good explanation, diachronic (Szemerényi 1996: 171) or synchronic, and I set it aside. Long syllabic *r* in Acc Pl *dātṝ́-n* and Gen Pl *dātṝ-ṇā́m* is due to a rule that has its origins in the inflection of *i/u*-stems (*agní*- 'fire'; Acc Pl *agnín*, Gen Pl *agnīnā́m*); the accent of *dātṝ-ṇā́m* can be accounted for if its *n* is the result of epenthesis in intermediate /dātr-ā́m/ (cf. Vedic *nar-ā́m* 'of the men' (Whitney 1889: 138)). Loc Sg *dātári* (cf. *rā́jani*), often described as a strong case form, does indeed group with the strong forms in showing accent on the stem vowel, but differs from them in that that vowel is short. Nom Sg *dātā́*, finally, shows the loss of word-final *n/r* that we observed in *rā́jā*, with length in *pitā́* confirming that that loss is accompanied by compensatory lengthening.

As noted, the paradigms of *dātā́r*- and *pitár*- illustrate the fact that there can be no general lengthening rule for the strong forms of gradational nominals. A shortening rule for weak forms, on the other hand, would be unproblematical; excluding the long syllabic *r* of *r*-stem Acc Pl and Gen Pl forms, no gradational stem shows a long stem vowel in any weak form. If we now ask whether there is any independent evidence for such a shortening rule, Loc Sg *dātári* and *rā́jani* provide a first installment thereof, assuming that length in the stem vowel of *dātār*- and *rā́jān*- is lexical. More evidence is provided by the *n*-stem paradigm of Table 8 (Kiparsky 1973: 816).

<table>
<tr><td colspan="4">Table 8 Paradigm of *ádhvān*- (m.) 'road'</td></tr>
<tr><td></td><td>Sg</td><td>Du</td><td>Pl</td></tr>
<tr><td>Voc</td><td>ádhvan</td><td rowspan="2">ádhvān-āu</td><td rowspan="2">ádhvān-as</td></tr>
<tr><td>Nom</td><td>ádhvā</td></tr>
<tr><td>Acc</td><td>ádhvān-am</td><td></td><td>ádhvan-as</td></tr>
<tr><td>Inst</td><td>ádhvan-ā</td><td rowspan="2">ádhva-bhyām</td><td>ádhva-bhis</td></tr>
<tr><td>Dat</td><td>ádhvan-e</td><td rowspan="2">ádhva-bhyas</td></tr>
<tr><td>Abl</td><td rowspan="2">ádhvan-as</td></tr>
<tr><td>Gen</td><td rowspan="2">ádhvan-os</td><td>ádhvan-ām</td></tr>
<tr><td>Loc</td><td>ádhvan-i</td><td>ádhva-su</td></tr>
</table>

The stem *ádhvān*- would be expected to alternate in the same way as *rā́jān*-, and, like the latter, it shows a long stem vowel in strong forms and a short one in weak forms with consonant-initial suffixes, where that short vowel, on the

analysis proposed above, is the result of shortening, syncope, and interconsonantal vocalization of *n*. But where weak forms of *rā́jān-* with vowel-initial suffixes show zero in place of the stem vowel, the corresponding forms of *ádhvān-* show short *a*. It is of course syllable structure that precludes syncope in a form like Inst Sg *ádhvanā*, since syncope would produce an intervocalic cluster *dhvn*, where *v* is a semivowel [w] or [ʋ] (Whitney 1889: 18, 20), that would entail either a rising sonority coda cluster *dhv* or a falling sonority onset cluster *vn*. But given the lexical shape /ádhvān/, the short stem vowel of *ádhvanā* shows that, while not deletable, that vowel has been subject to shortening. The same phenomenon of shortening without syncope can be observed in the paradigm of *atmā́n-* 'soul, self' (Whitney 1889: 157-158), which differs from that of *ádhvān-* only in showing stem-final accent throughout.

It seems clear, then, that there is considerable evidence for a rule shortening long stem vowels in weak forms. This conclusion provides us with an answer to the question of how the alternation between *ā* and zero in the paradigm of *rā́jān-* is to be analyzed: long *ā* first undergoes shortening in weak forms and is only then subject to syncope, conditional on syllable structure restrictions and lexical exceptions such as the Loc Sg suffix of certain stem classes. The shortening rule may be stated as in (5).

(5) $\bar{a} \rightarrow a \: / \: C \:\_\_\: R(C)_N$ [$_{Case}$ W]

Morphologically complex *ā*, however, is not subject to (5). Thus, *prā́ñc-* 'turned forward, turned toward the East' (*pra-* 'forward', *-añc-* 'in the direction of) retains a long vowel throughout its paradigm (Whitney 1889: 152-153). *prā́ñc-*, that is, is not a gradational nominal, in accordance with the observation above that a vowel-initial suffix, in order to form such a nominal, must attach to a consonant-final base.

As a final type of gradational *n*-stem, let us consider a representative of the heteroclitic *r/n*-stems of Proto-Indo-European, *áhān-* 'day' (n.), treated also by Stump (2001: 187-188, 191-192). Concerning the length of the stem vowel, we may note that while most neuter *n*-stems show a long vowel in the Nom/Acc Pl, the only case form guaranteed to be strong, Whitney (1889: 160) quotes *ū́dhan(i)* for the plural of 'udder', another (former) heteroclite, so that, even within the small set of etymologically heteroclitic stems, there is reason to view the length of the stem vowel as contrastive. Like *rā́jān-*, *áhān-* has a variant Loc Sg form that has not undergone syncope, and like other neuter *n*-stems, it also has a non-syncopated variant Nom/Acc Du form, in this case *áhanī* (Whitney 1889: 158, 160).

Table 9   Paradigm of *áhān-* (n.) 'day'

	Sg	Du	Pl
Nom Acc	áhas	áhn-ī	áhān-i
Inst	áhn-ā		áho-bhis
Dat	áhn-e	áho-bhyām	áho-bhyas
Abl	áhn-as		
Gen		áhn-os	áhn-ām
Loc	áhn-i		áhas-su

Heteroclitic stems originally showed an *r*-stem form in the Nom/Acc Sg and *n*-stem forms elsewhere, and this distribution is preserved in Vedic (Macdonell 1916: 70). In later Sanskrit, however, the paradigm has been reanalyzed in two ways. First, as Table 9 shows, the *r*-stem Nom/Acc Sg has been replaced by an *s*-final form, presumably because the contrast between *r* and *s* is neutralized word-finally to [h] (*visarga*, orthographic *ḥ* (see Whitney 1889: 23)), and *s* is far more common in that position than *r*. Second, the *s*-stem alternant has been generalized to all pre-consonantal contexts. Before a voiced obstruent, *s* voices to *z*, and *az* becomes *o* (Macdonell 1916: 4, 59); syllable-finally, as in *áhas* and *áhas-su*, *s* is realized as [h]. The upshot, given that *s* and *n* cannot be related by phonological rule, is that there must be two listed alternants for the stem that differ at least in their final consonant; this is a case, then, of so-called "weak suppletion". The distribution of the two alternants, however, is phonologically conditioned: the *n*-final alternant appears before vowels, the *s*-final alternant elsewhere (alternately, *n* appears as a syllable onset, *s* as a coda). Minimally, then, the lexical entry of the stem will include the phonological representation (6); the stem vowel *ā* will shorten under rule (5) in all weak forms, and

the resulting *a* will syncopate under rule (4) when syllable structure allows, specifically in *n*-stem forms.

$$(6)\quad \text{áhā}\begin{bmatrix} \text{n}\,/\,\underline{\quad}\text{V} \\ \text{s} \end{bmatrix}$$

It is worth noting that the distribution encoded in (6) mirrors that seen in many cases where the alternation is apparently due to a phonological rule. For example, the large number of stems whose stem-final consonant alternates between a velar and a palatal point of articulation, an alternation that involves the single feature [±back] and is presumably rule-governed, show the palatal before a vowel and the velar before a consonant or word-finally (see Whitney 1889: 146-147). We will return below to this correspondence between the distribution of suppletive alternants and that of rule-related alternants.

A final type of *n*-stem treated by Stump (2001) is that of adjective stems in *-in-* such as *bal-ín-* 'strong' (*bála* 'strength'; Whitney 1889: 162). As expected, given their stem vowel *i*, *in*-stem adjectives do not undergo syncope, but they do undergo a rule deleting stem-final *n* before a consonant; thus, Inst Sg *balín-ā*, for example, but Inst Pl *balí-bhis*. Because of their non-gradational nature, I will not discuss *in*-stems further.

2.3 Stems ending in *ns* and *ñc* (suffixes *-yāns-, -vāns-, -añc-*)

There are two important suffixes that end in the cluster *ns*, adjectival comparative *-yāns-* and perfect participial *-vāns-*. The first of these is completely regular, in the sense that while it has five allomorphs, all five are predictable in terms of rules that we have already seen. The phonological form /yāns/ loses its final consonant when word-final in accordance with Final Cluster Reduction, so that the Nom Sg M of *śré-yāns-* 'better' (Whitney 1889: 172) is *śréyān*, and the Voc Sg M, which also undergoes Vocative Shortening, is *śréyan*. In the remaining strong forms, the suffix appears unaltered, so that the Voc/Nom/Acc Pl N, for example, is *śréyānsi*. As a result of Shortening, Syncope, and Vocalization (*yāns > yans > yns > yas*), the suffix appears as *-yas-* in weak forms; before a voiced obstruent the *s* voices, and the sequence *az* then becomes *o*, as we observed above with regard to the paradigm of *áhan-* 'day'. The Inst Sg of /śré-yāns-/ is thus *śréyasā*, and the Inst Pl is *śréyobhis*.

In contrast to the regularity of comparative *-yāns-*, the suffix *-vā́ns-* of the perfect participle exhibits a degree of suppletion. Table 10 shows the inflection of *tasth-i-vā́ns-*, the perfect participle corresponding to the root *sthā-* 'to stand'; the *i* that separates the stem and the suffix is epenthetic.

Table 10 Paradigm of *tasthivā́ns-* 'having stood'

	Sg M	Sg N	Du M	Du N	Pl M	Pl N	
Voc	tásth-i-van	tasth-i-vát	tasth-i-vā́ns-āu	tasth-úṣ-ī	tasth-i-vā́ns-as	tasth-i-vā́ns-i	Voc
Nom	tasth-i-vā́n				tasth-i-vā́ns-as		Nom
Acc	tasth-i-vā́ns-am				tasth-úṣ-as		Acc
Inst	tasth-úṣ-ā		tasth-i-vád-bhyām		tasth-i-vád-bhis		Inst
Dat	tasth-úṣ-e		tasth-i-vád-bhyām		tasth-i-vád-bhyas		Dat
Abl	tasth-úṣ-as				tasth-i-vád-bhyas		Abl
Gen	tasth-úṣ-as		tasth-úṣ-os		tasth-úṣ-ām		Gen
Loc	tasth-úṣ-i		tasth-úṣ-os		tasth-i-vát-su		Loc

In strong forms, the paradigm of *tasthivā́ns-* mirrors that of comparatives in *-yāns-* precisely: the Nom Sg M shows the suffix allomorph *-vā́n*, the Voc Sg M shows *-ván*, and remaining strong forms have *-vā́ns-*. In weak forms, however, there is no suffix allomorph *-*vás-*; before a vowel we find *-úṣ-*, and before a consonant or word-finally, *-vát-*. Because (given the well-known rule retroflexing *s* after the segments *r*, *u*, *k*, *i*) [uṣ] can be considered the (postconsonantal) reflex under shortening, syncope, and vocalization of /vās/ (*Cvās > Cvas > Cvs > Cus*), and [vat] can be considered the reflex under shortening, syncope, and vocalization of /vānt/, we may take the lexical representation of the suffix to be as in (7).

$$(7) \quad \text{vā́} \begin{bmatrix} \text{s /\_\_\_} [_{\text{Case}} \text{V} \quad \text{W}] \\ \text{nt /\_\_\_} [_{\text{Case}} \quad \text{W}] \\ \text{ns} \end{bmatrix}$$

(7) says that the perfect participial suffix is realized as /vā́s/ in weak case forms before a vowel, as /vā́nt/ in weak case forms otherwise, and as /vā́ns/ otherwise. That lexical representation illustrates again, then, that the distribution of suppletive alternants, here conditioned both by a following vowel and by the morphosyntactically defined set of weak forms, tends to mirror the distribution of alternants that are related by rule.

A final suffix creating gradational stems is adjectival *-añc-* 'in the direction of' (originally a root 'bend'). The paradigm of *úd-añc-* 'upwards, northwards' is shown in Table 11.

Table 11   Paradigm of *údañc-* 'upwards, northwards'

	Sg			Du			Pl			
	M	N		M	N		M	N		
Nom	úd-an	úd-ak		úd-añc-āu	údīc-ī		úd-añc-as	úd-añc-i		Nom
Acc	úd-añc-am						úd-īc-as			Acc
Inst	úd-īc-ā						úd-ag-bhis			Inst
Dat	úd-īc-e			úd-ag-bhyām			úd-ag-bhyas			Dat
Abl	úd-īc-as									Abl
Gen				úd-īc-os			úd-īc-ām			Gen
Loc	úd-īc-i						úd-ak-su			Loc

For this subclass of stems in *-añc-*, the suffix has a weakly suppletive allomorph *-īc-* in weak case forms before a vowel. Otherwise it is *-añc-*, which in weak cases undergoes Syncope and Vocalization, followed by a rule that converts stem-final palatals to velars syllable-finally (see Whitney 1889: 146-147) and regressive voicing assimilation in obstruent clusters. The lexical representation of the suffix may thus be as in (8), with the suffix-final consonant common to the two allomorphs factored out and represented to the right.

$$(8) \quad \begin{bmatrix} \text{ī /\_\_\_} [_{\text{Case}} \text{V} \quad \text{W}] \\ \text{añ} \end{bmatrix} \text{c}$$

3 Summary and conclusion

Section 2 proposed an account of the alternations of Sanskrit nominal and adjectival stems of the form XCaR(C)- based on the two rules Shortening and Syncope ((5) and (4) above), repeated as (9) and (10).

(9) Shortening: $\bar{a} \rightarrow a$ / C ___ R(C) $_{\text{N}}$] [$_{\text{Case}}$ W]

(10) Syncope: $a \rightarrow \emptyset$ / C ___ R(C) $_{\text{N}}$] [$_{\text{Case}}$ W]

While Shortening is exceptionless in the set of gradational nominals, Syncope is subject both to lexical exceptions (notably, the Locative Singular for stems in *-tar-* and (optionally) stems in *-an-*) and exceptions dictated by syllable structure. It may be noted that Shortening and Syncope are inverses, respectively, of the operations of *vṛddhi* (lengthening) and *guṇa* (vowel insertion). It is also noteworthy that the environment W, which will have the representation (11) if Nom/Voc/Acc duals neuter are weak forms, plays a crucial part in both rules.

(11) W = [+Obl] ∨ [Acc∧[+Pl]∧M] ∨ [[–Obl]∧[–Pl]∧N]

The importance of the environment W is also underlined, as we have noted, by the fact that it plays a role in regulating

the distribution of suppletive alternants, in particular in the representations (7) and (8) above. There is little, doubt, then, that W represents a significant generalization, in spite of its disjunctive nature. This is not the same, of course, as saying that it represents a new species of grammatical object, such as a morphomic index.

In developing the above account of gradational stems, we have also had occasion to refer to a considerable number of other rules, many of them assumed as well by Stump (2001). Apart from rules dealing with accent, we have seen a rule shortening stem vowels in the vocative singular (Vocative Shortening), a rule lengthening stem vowels in the nominative singular of stems in -*mant*- and -*vant*- (Stump 2001: 171), a rule deleting a word-final sonorant in the nominative singular with compensatory lengthening of the preceding vowel (*pitar*- 'father', Nom Sg pitā́), a rule lengthening *i*/*u*/*r* in the accusative and genitive plural, and a rule shifting stem-final palatals to velars when syllable-final. Automatic rules, free of morphological conditioning, that we have assumed are vocalization of sonorants interconsonantally and the shift of *ṇ* to *a* (Stump 2001: 186), simplification of final clusters by deletion of all but the first member (Stump 2001: 171), regressive voicing assimilation in obstruent clusters (Stump 2001: 171), and the shift of *az* to *o* (Stump 2001: 199).

Any account of phonological alternations must specify how lexical representations are converted by the grammar to surface or phonetic representations. The framework assumed here, in particular for word-level phonology, is a maximally simple one according to which word-level underlying representations, assembled by the grammar from underlying forms of stems and affixes, are submitted to a battery of phonological rules whose outputs are word-level surface or phonetic representations. This framework can be schematized as in (12).

(12)   [Word-level URs] — Phonological rules → [Word-level SRs]
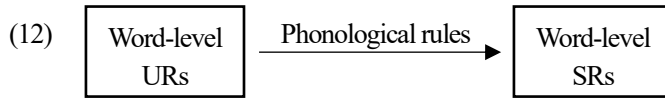
We may note concerning the analysis of section 2 in particular that the degree of phonological abstractness assumed is extremely limited: apart from the three weakly suppletive lexical representations (6)–(8), each stem or suffix has a unique lexical representation that coincides with an occurring alternant thereof, and extrinsic ordering is appealed to only tangentially, in the suggestion that *n* is epenthesized at stem boundary in the genitive plural of *r*-stems subsequent to the determination of accent.

The grammatical architecture assumed by Stump (2001: chapter 6) is considerably more complex. In it, crucially, stem alternations are treated in isolation from affixal material, which is introduced by realization rules each of which rewrites a root (for which concept see Stump 2001: 33) as an inflected form in the presence of a particular morphosyntactic property set (for Sanskrit examples, see Stump 2001: 181). The rule types Stump postulates to account for stem alternations include Stem-formation rules, context-free rules that create a set of stem alternants from the underlying form of the stem; Stem-indexing rules, which associate those stem alternants with morphomic indices (in the Sanskrit case, the labels "Strong", "Weak", "Middle"); and stem-selection rules, which associate the stem alternants with sets of morphosyntactic properties. Roughly, then, the relationship of these rule types can be represented as in (13).

(13)   [Stem-level URs] — Stem-formation rules → [Stem alternants] ← Stem-indexing rules → [Morphomic Indices]
        [Stem alternants] ↕ Stem-selection rules ↕ [MS properties]
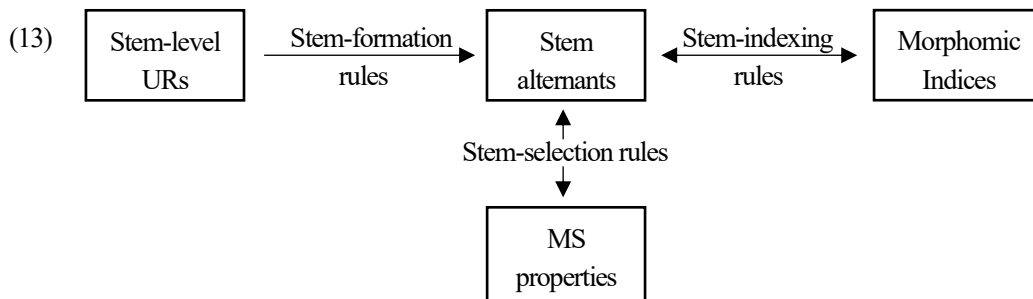
If we now ask what benefits this elaborate architecture is held to confer, Stump's answer appears to be that it allows us to capture the intricate relationship between ablaut grade (long, short, or zero) and morphomic index (strong, middle, or weakest) that is observed in Sanskrit nominal paradigms. The failure of these two classificatory schemes to correspond one-to-one is the content of Stump's (2001: 184) Indexing Autonomy Hypothesis (IAH) and the raison d'être of his stem-indexing rules (2001: 190), and the validity of the IAH is presented (2001: 199) as the "central conclusion" of his discussion of Sanskrit noun inflection.

10

Stump's morphomic indices are essentially morphosyntactically defined subregions of the nominal paradigm, so the IAH may be paraphrased by saying that, across the class of gradational stems, a given ablaut grade does not always appear in the same subparadigm, and a given subparadigm does not always display the same ablaut grade. From the perspective developed in section 2 above, such a failure of correspondence is unsurprising; in a generative phonological analysis, what allomorphs of a stem appear in what subregions of a paradigm depends on the interaction of phonological representations with phonological rules, and there is no expectation that it should be uniform across an entire inflectional system or a major subpart thereof. Let us look at the concrete examples that Stump (2001: §6.3.3) adduces in support of the IAH and see how they are treated in the analysis of section 2.

Stump's first example of the failure of ablaut grade and morphomic index to correspond is the fact that while some gradational stems (e.g. adjectives in *-mant-* and *-vant-*) have strong stem alternants in guṇa grade (i.e. with short *a*), others (e.g. adjectival comparatives in *-yāns-* and the majority of *n*-stems) have strong stem alternants in vṛddhi grade (i.e. with long *ā*). In the analysis of section 2, however, this is simply a matter of lexical (i.e. underlying) representation: we have taken the stem vowels in the first set of cases to be phonologically short and those in the second set to be phonologically long. The failure of correspondence in question is therefore unremarkable.

Stump next considers three examples of suppletion. He notes that in the paradigm of *údañc-* (Table 11 above), weak case forms with consonant-initial suffixes show the zero grade of the strong stem, while weak case forms with vowel-initial suffixes show a suppletive stem alternant. In contrast, in the paradigm of *áhān-* (Table 9), weak case forms with vowel-initial suffixes show the zero grade of the strong stem, while weak case forms with consonant-initial suffixes show a suppletive stem alternant. In the paradigm of *tasthivā́ns-* (Table 10), finally, the zero grade of the strong stem appears nowhere in the paradigm, and weak case forms with consonant-initial suffixes and weak case forms with vowel-initial suffixes both show suppletive alternants, distinct in the two cases. Since in the analysis of section 2 the question of what part(s) of a paradigm host suppletive alternants is purely a matter of lexical representation (see, respectively, (8), (6), and (7) above), it is difficult to ascribe any theoretical significance to facts of this sort.

The third and last example Stump (2001) adduces in support of the IAH in his section 6.3.3 involves the stem alternant appearing in the vocative singular. He notes that this alternant is usually the strong stem, but that when the strong stem shows vṛddhi grade, the vocative shows guṇa grade instead. Stump (2001: 188) attributes this behavior only to a "subclass" of consonant-stem nouns having vṛddhi grade strong stems, but in fact, as we have seen above, shortening of stem vowels in the vocative singular is general not only for gradational nominals, but across the Sanskrit declensional system as a whole: it applies in *ī*-stems, *ū*-stems (although the vocative of *ā*-stems shows a suffix *-e*), *ān*-stems, agent nouns in *-tār-*, and stems in *-yāns-* and *-vāns-*. This generalization is expressed in the analysis of section 2 by the rule of Vocative Shortening. Clearly, rule-governed phonological behavior of this sort is not an argument for the existence of morphomic indices or for stem-indexing rules assigning those indices to stem alternants.

It is hard to avoid the conclusion, then, that the extra grammatical machinery of (13) compared to (12) is of dubious value, at least in the case at hand. It is also hard to avoid the suspicion that the taxonomic approach to morpheme alternation that (13) embodies, with stem alternants in the Sanskrit case classified as vṛddhi, guṇa, or zero-grade, their paradigmatic contexts classified as strong, middle, and weak, and correlations between those two classifications then pursued, results in the backgrounding or neglect of phonological generalizations. More specifically, as a result of this stem-based taxonomic approach, Stump neglects to look at the two gradation alternations, the length alternation and the vowel-zero alternation, at the level of the segment, to ask whether or not those segment-level alternations are rule-governed, and to determine their derivational directionality (that is, which alternant is basic) if they are. The Vocative Shortening rule just mentioned is one example of a phonological generalization that Stump's account does not register, and the fact that no weak form of a gradational nominal contains a stem vowel *ā*, the distributional generalization that underlies the Shortening rule (9), is another. A third point on which a phonological generalization is obscured by Stump's treatment is the fact that the suppletive alternants of *áhān-* 'day' and parallel stems are distributed according to syllable structure, as noted above: the final consonant of the stem is *n* when that consonant constitutes a syllable onset, but *s* when it constitutes a coda.

Finally, an inevitable corollary of the neglect of phonological generalizations just documented is a blurring of the distinction between suppletion and rule-governed alternation. Thus, for example, Stump (2001: 178-179) takes a particular set of stem-selection rules "to account for the alternation of strong and middle stems in the masculine and neuter paradigms of BHAGAVANT and TASTHIVANS." Under the account of section 2 above, however, the alternation between

the strong and middle (i.e. weak) stems of *bhagavant-* is entirely a result of Syncope and its automatic consequences, while the strong and middle stems of *tasthivāns-* are in a weakly suppletive relationship because the former ends in *s*, while the latter ends in *t*. Stump's failure to treat the gradation alternations $\bar{a} \sim a$ and $a \sim \emptyset$ as rule-governed means that this collapsing of the distinction between suppletion and regular alternation with respect to what he calls stem selection is a general feature of his account.

The analysis of Sanskrit nominal gradation proposed in section 2 is not necessarily the only possible account of its type. But if any morphophonological analysis of gradation is viable, the Sanskrit data, Stump's claims to the contrary notwithstanding, provide no support for the postulation of morphomic indices and stem-indexing rules, for a level of morphomic representation mediating between morphosyntax and morphophonology (Aronoff 1994: 25), or for an autonomous morphological component independent of those two subfields. And if that is the case, finally, there is little basis for Spencer's (2019: 254) criticism of those who may have neglected Stump's analysis, much less for his imputation to them of bad faith ("[deliberate suppression of] reference to blatant counterexamples.").

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