

META-TEMPLATES & THE UNDERLYING (DIS-)UNITY OF SANSKRIT REDUPLICATION

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0. Introduction.

As part of the special attraction which Sanskrit has long held for Western linguists, one aspect of the grammar of this language that has received more than its fair share of mention in the literature, even in studies ostensibly devoted to such topics as the morphophonology of aspiration alternations, has to do with reduplication in the verb system (for relevant bibliography, see Janda & Joseph 1989). In two recent studies (Janda & Joseph 1986 and Joseph & Janda 1988), we have ourselves analyzed Sanskrit verbal reduplication from the perspective of the general framework known as "Process Morphology", an approach whose adherents literally range from A to Z (cf., *inter alia*, Anderson 1977, Aronoff 1976, Bach 1983, Dowty 1978, Hoeksema 1984, Janda 1983b, Matthews 1965, Schmerling 1983, Thomas-Flinders (ed.) 1981, and Zwicky 1985, to cite just a small sample of authors and their early work). In Process Morphology, non-root "morphemes" are not treated as things--e.g., as lexical entries or material added by rules--but instead are themselves rules--i.e., processes--triggered primarily by the morpho-syntactico-semantic features which they express. As a result, many morphological operations appear to require the power of the transformational rule-format: especially permutations (metatheses), but also some infixations and complex affixations. This viewpoint contrasts sharply with the alternative framework usually known as "Prosodic Morphology"--which, since its beginnings in, e.g., McCarthy 1979 and Marantz 1982, has continued to expand and develop via such major reorientations as that of McCarthy & Prince 1986-MS and later works. In Prosodic Morphology, no morphemes are processes--i.e., morphological rules; rather, all morphemes are indeed things--e.g., lexical entries--although they often consist solely of templates that involve only a minimal amount of phonological content. On this approach, the transformational rule-format can apparently be dispensed with completely, and so it seems that morphological theory can be highly constrained. Even infixations and complex affixations, for instance, can be analyzed entirely in terms of templates and largely universal autosegmental association-conventions applying to individual tiers, with all processes which appear to have morphological triggers being treated as "morphologically conditioned phonological rules".

In our three previously-cited joint papers (hereafter J&J '86, '88, '89), we examined reduplicative verb-morphology in Sanskrit with an eye to comparing the two abovementioned approaches--especially because, ever since Marantz 1982, reduplication has generally been held to represent the paradigm case where Prosodic Morphology can be shown to be much more constrained than Process Morphology. In those works, we argued that Prosodic Morphology cannot insightfully express the mixture of formal similarity and diversity exhibited by the various reduplications in Sanskrit, claiming that this situation receives a homogeneous treatment only in a uniformly rule-based approach like Process Morphology. In particular, since individual idiosyncrasies in the realizations of reduplication across the different verbal categories of Sanskrit require that these reduplications be stated separately, some mechanism is needed for expressing the significant commonalities which they also share. J&J '86, '88, '89 therefore proposed (following Janda 1982b) a novel device which not only expresses--as generalizations--these formal similarities across distinct morphological rules but also groups together such sets of processes into larger ensembles. In this way, for example, we can posit a "meta-redundancy-rule" (or "redundancy meta-rule")--i.e., a redundancy statement defined over rules--which unifies the multitudinous Sanskrit reduplications as a "rule constellation": a set of rules which are united by one or more shared properties of form but which cannot be collapsed with one another due to one or more incompatible differences of form and/or function.

Still, at least in J&J '86, '88, the main goal which we pursued was not that of attempting to demonstrate the efficacy of a Process Morphology account of Sanskrit reduplication vis-à-vis analyses in other frameworks. Rather, those two earlier studies primarily sought to promote a particular solution--one making use of rule constellations and meta-redundancy-rules--as the best way to capture non-collapsible formal similarities across distinct morphological elements. Nevertheless, the specific approach which we adopted also required that reduplication be analyzed as a set of morphological rules, thereby allowing rule constellations and meta-redundancy-rules to be invoked as a means of capturing the relevant cross-rule similarities. We have since realized, however, that the continued dominance in contemporary morphology of non-processual approaches, especially Pro-

sodic Morphology, has had the result that processually expressed notions like rule constellations and meta-redundancy-rules (especially the latter) have not received the attention we feel they deserve, even though they can quite easily be translated into prosodic analogues.

In order, therefore, that the baby not be thrown out with the bathwater--i.e., that the concept of meta-redundancy-rules not be tarred with the same brush as rule constellations and Process Morphology--we will in Section 3 below set aside the latter and adopt, as an alternative avatar of our constellational analysis for Sanskrit reduplication, a templatic, prosodic framework. It is thus our primary goal in this paper to show that a minimal extension of Prosodic Morphology so as to include the already conceptually implied (and tacitly employed) notion of "meta-template" permits an insightful analysis of the several Sanskrit reduplications in a way which expresses the same generalizations as do rule constellations and meta-redundancy-rules, but without requiring the recognition of any morphological processes.* The present study therefore does not constitute counterevidence to Process Morphology (although the loss of a claimed advantage over Prosodic Morphology could be considered a lessening of "pro-evidence"). Rather, the issue of capturing non-collapsible formal similarities across distinct morphological elements transcends the process/prosody debate, since it demands as well as receives a solution in both approaches.

1. An Initial Comparison of Prosodic and Processual Morphology--vis-à-vis German Umlaut.

Ever since the appearance of McCarthy 1979, the primary appeal of Prosodic Morphology has been its ability to achieve processual surface-effects (like apparent metathesis) without recourse to processual stipulations. In this regard, it is the central, representational notion "prosodic template" which, in conjunction with association conventions that are to a high degree independently motivated and even universal, allows Prosodic Morphology to impose such strong restrictions on language-particular morphological rules. The prosodic achievement is consequently that, with the development of an increasingly refined set of association conventions (e.g., now also from the "edge in"; cf. Yip 1988), morphological rules involving both inputs and outputs can basically be dispensed with in favor of a straightforward set of templates constraining output form alone.

Process Morphologists' responses to Prosodic Morphology have therefore centered on attempts to show that, in certain instances, an exclusively templatic analysis, unsupplemented by rules, is insufficient to express certain obvious morphological generalizations. On the one hand, many defenses of Process Morphology focus on such *prima-facie* processual phenomena as metathesis and exchange-rules (cf., e.g., Janda 1983b, 1984, 1987:27-47, 298-407). The argumentation reconsidered here, however, involves the suggestion that, in their rule-centeredness, analyses expressed in terms of processes and (meta-)redundancy-rules are inherently more unified than prosodic treatments which combine templatic and other lexical entries with redundancy rules.

One earlier claim regarding an apparent instance of this sort focused on the different subgeneralizations which must be recognized within the general process of Modern High German [NHG] umlaut (cf. Janda 1982a, 1982b, 1982c-MS, 1983a)--a set of phenomena later discussed by J&J '86, '88 as constituting perhaps the world's largest rule-constellation, with more than sixty members. In particular, this extremely diverse nature of umlaut in contemporary German exists because a single purely phonological rule of Pre-Old High German--in origin probably a completely allophonic process formulable in segmental terms roughly as $V \rightarrow [-\text{back}] / __ C_0 [-\text{consonant}, -\text{back}, +\text{high}]$ --has been transformed, through a series of steps leading to further phonologization and then to morphologization and fragmentation, into a repeated part of numerous morphological rules in NHG. This recurrent formal pattern, which can be factored out of the myriad NHG inflectional and derivational rules that involve (i) umlaut alone (occasionally), (ii) umlaut with prefixation (somewhat less frequently), or (iii) umlaut with suffixation (by far most commonly), can be expressed approximately as $/\dots V \dots/ \rightarrow / \dots [V, -\text{back}, -\text{low}] \dots/$.¹

Some idea of the wide range of NHG categories which are wholly or partially marked by umlaut can be gained from the small sample which follows. In this listing (which in subpart (iii) is structured according to an alphabetical order based on the initial letter of representative suffixes that accompany umlaut), each entry has the format *basic form* / *derived form*, 'gloss for basic form' / 'gloss for derived form'. In order to maximize comparability, all of the roots involved have short /a/ (orthographic <a>) as their underlying vowel, with short /[ɛ]/ (orthographic <ä>) as their umlauted counterpart. Thus, (i) two examples of umlaut alone are *Hammer/Hämmer* 'hammer'/'hammers' and *hart/härt-(en)* 'hard'/'(to) harden'; (ii) one illustration of umlaut with prefixation is *Ast/*

Ge-äst 'branch'/'group of branches', and (iii) eighteen examples of umlaut with suffixation are *Lamm/Lämm-chen* 'lamb'/'lambkin', *Ball/Bäll-e* 'ball'/'balls', *Arm/Ärm-el* 'arm'/'sleeve', *Hanf/häuf-en* 'hemp'/'hempen', *Dach/Däch-er* 'roof'/'roofs', *Gans/Gäns-er(-)ich* 'goose'/'gander', *Wachs/wächs-er(-)n* 'wax'/'waxen', (archaic) *Tann(-)e/Tänn-icht* 'fir-tree'/'fir-thicket', *Macht/mächt-ig* 'might'/'mighty', *Arzt/Ärzt-in* 'physician (male/female)', *Stadt/städt-isch* 'city'/'urban', *Abt/Äbt-iss(-)in* 'abbot'/'abbess', *Bach/Bäch-lein* 'brook'/'brooklet', *Mann/männ-lich* 'man'/'masculine', *schwach/Schwäch-ling* 'weak'/'weakling', *Ver-stand/Ver-ständ-nis* 'intellect'/'understanding', *arm/ärm-st(-)* 'poor'/'poorest', and *fall(-en)/fäll-t* '(to) fall'/'(s)he/it falls'.

These and similar forms provide several kinds evidence for the fragmentary nature of NHG umlaut. First, they display variable productivity. Thus, for example, diminutive formation using the suffix *-lein* is accompanied by umlaut for all roots (e.g., *Mutter* 'mother', hence *Mütter-lein*/**Mutter-lein* 'little mother, mommy'), but diminutive formation using the suffix *-chen* is at most optionally accompanied by umlaut for some roots (cf. *Mütter-chen*/*Mutt(er)-chen* 'little mother, mommy') and never cooccurs with umlaut for other roots (like *Tant(-)e* 'aunt', hence **Tänt-chen*/*Tant-chen* 'auntie'), although most roots do obligatorily show umlaut with *-chen* (e.g., *Hand* 'hand', hence *Händ-chen*/**Hand-chen* 'little hand'). Similarly, some formations with umlaut are virtually or totally unproductive isolates, such as (respectively) *Tänn-icht* and *Äbt-iss(-)in* above, as opposed to the more or less completely productive formations possible with suffixes like *-in* and *-lein* (cf., e.g., *Lands-mann/Lands-männ-in* 'compatriot (male/female)').

Second, though, forms like those listed above often show variability of umlaut even with regard to the same root and/or the same suffix. Thus, consider the following groupings, given in the format *singular / plural / -ig-derived adjective*, 'singular gloss' / 'plural gloss' / 'adjectival gloss'. The consistent lack of umlaut in *Arm/Arm-el...-arm-ig* 'arm'/'arms'/'...-armed' is unusual, and the consistent presence of umlaut in *Bart/Bärt-el/bärt-ig* 'beard'/'beards'/'bearded' is quite common, but the asymmetrical inconsistency of umlaut in *Tag/Tag-el...-täg-ig* 'day'/'days'/'lasting ... days' vs. *Busch/Büsch-e/busch-ig* 'bush'/'bushes'/'bushy' is also not uncommon. Perhaps most telling are examples like *Sach(-)e* 'thing' vs. *säch-lich* 'neuter' vs. *sach-lich* 'objective', where even the same root + suffix combination has a pattern of umlaut-presence vs. absence which is arbitrarily correlated with a semantic distinction (on these and similar facts viewed from a quite different perspective, cf. also the pioneering account in Wurzel 1970).

Third, finally, and most importantly, umlaut has different structural descriptions in different morphological categories. For instance, certain morphosyntactic contexts do not allow umlaut with the root-vowel /au/ or in polysyllabic roots, while other contexts do, even for the same root. This is the case, for instance, with the comparative and superlative of adjectives. That umlaut of a root vowel can accompany suffixation with *-er* 'comparative' and *-(e)st(-)* 'superlative' is demonstrated by word sets like abovementioned *arm/ärm-st(-)* 'poor'/'poorest' (cf. also *ärm-er* 'poorer'). In similar fashion, the fact that adjective-roots which are polysyllabic and/or whose vowel is /au/ can in principle undergo umlaut is shown by examples like, respectively, *lauter/läuter(-n)* 'pure'/'purify' and *braun/Bräun-e* 'brown'/'brownness, tan'. Nevertheless, it is simply the case that no polysyllabic or /au/-ful adjective-roots ever undergo umlaut in the comparative or the superlative: cf., e.g., **läut(e)r-er/laut(e)r-er* 'purer' and **läuter-st(-)/lauter-st(-)* 'purest', as well as **bräun-er/braun-er* 'browner' and **bräun-st(-)/braun-st(-)* 'brownest'. A parallel polysyllabic adjective whose frontable vowel is not /au/ is *munter* 'cheerful'; that its short /U/ is in principle umlautable is shown by abovementioned *Mutter/Mütter-lein* 'mother'/'little mother, mommy', but we find comparative **münt(e)r-er/munt(e)r-er* 'more cheerful' and superlative **münter-st(-)/munter-st(-)* 'most cheerful'.²

As a result, it indeed appears that there are at the very least two distinct morphological processes involving umlaut in NHG, and most probably more than sixty. To repeat, some of these umlauts are the sole marker of a morphological category (like 'plural' in abovementioned *Hammer/Hämmer* 'hammer'/'hammers'), but most of them cooccur with processes of prefixation or suffixation (or both, as in *lach(-en)/Ge-läch-ter* '(to) laugh'/'laughter'). And, in order to express the common vowel-fronting aspect of these umlaut-related rules, it seems clear that there is a need for a meta-redundancy-rule like the one suggested above.

However, a potentially quite serious obstacle must be confronted by anyone who proposes to cite NHG umlaut as perhaps the largest and hence the best example of a morphological rule-constellation--and thus as a problem which Prosodic Morphology, because of its inherently non-processual nature, apparently cannot avoid. This obstacle has to do with the fact that, while the various NHG umlaut-processes are differentiated by a wide range of factors including disparate produc-

tivity, cross-cutting lexical idiosyncrasies, and distinct structural descriptions, they all still have (at least in the contemporary standard language) exactly the same structural change. As a consequence of their being so similar (if not identical) in this way, though, the proposal that there are sixty-some NHG umlauts which largely cooccur with other morphological rules is sure to provoke the same response of nearly automatic rejection that Kiparsky 1982:38-39 expresses concerning the parallel possibility of recognizing a constellation of English Trisyllabic Shortening processes vis-à-vis the affixes with which that rule generally occurs: "...[In a]n ... approach ... deny[ing] the phonological character of rules such as TrisyllabicShortening...[, i]t is commonly said that rules of this type are to be considered 'morphological' or 'morphologized'. This claim may actually mean a number of things, since there are several possible ways of treating morphologically conditioned rules in the phonology. But on any of the possible construals, the properties of the rule seem to be obscured rather than explained by the proposal. ...[One] version is that morphophonemic processes are integral parts of morphological operations. This is the most unfortunate treatment of all because it denies that there is a single process involved, and claims that there are as many 'Trisyllabic Shortening' Rules as there are suffixes that can trigger the shortening process. Since the shortening is stated separately in connection with each affixation process, there is no way in this theory to distinguish between English and a hypothetical language in which each suffix triggers its own arbitrary set of changes in the stem."

Of course, one can immediately attempt to overcome Kiparsky's objections by pointing out that it is precisely the nature and purpose of meta-redundancy-rules to unify a large set of, e.g., English Trisyllabic Shortenings or NHG umlaut-processes as individual instantiations of a single generalization. Nevertheless, the vehemence with which Kiparsky rejects a constellational analysis for English makes it clear that the various umlauts of NHG are so similar (if not identical) in form with respect to one another that they probably do not provide the optimal motivation for meta-redundancy-rules--whereas the Sanskrit reduplications, to which we now turn, show much more formal divergence and thus constitute a far better test-case.

2. The Prosodically Problematic Character of Sanskrit Reduplication.

The morphosyntactic categories marked by reduplication in Sanskrit are nominal as well as verbal. Examples of nominal reduplication include, e.g., emphatic *vayám-vayam* 'we ourselves', with repetition of an entire word (but retention of only one accent), and adverb-like *rathaa-rathi* 'chariot against chariot' (cf. *ratha-* 'chariot'), with repetition of parts of a word, although some aspects of the overall vocalism are fixed (here, specifically, the *-aa...i*). The verbal reduplications encompass the three tense-stems--present, perfect, and aorist--and two so-called "secondary" (roughly, derivational) conjugations: the intensive and the desiderative. At least for verbs (the only word-class in the language for which reduplication has been discussed in the generative literature), Sanskrit reduplication has been treated as if it were a unitary phenomenon, involving a single templatic prefix CV-, by virtually all Prosodic Morphological analyses other than Steriade 1988. These analyses concede at most that there is some variation in which vowel (if any) is prelinked to the prefixal template: cf., e.g., *ta-tap-*, the more unmarked vowel-copying perfect-stem of \sqrt{tap} 'heat', vs. *vi-vak-*, the more marked vowel-prespecifying present-stem of \sqrt{vac} 'speak'. As emphasized by both J&J '86, '88 and Steriade 1988, though, Sanskrit reduplication shows numerous further differences both across and within the five relevant verbal categories. We begin our discussion here by providing a brief overview of the facts (see J&J '86, '88 and Whitney 1885a, 1885b for more details) and some initial consideration of how they would be dealt with in a templatic approach.

Given that there can be prelinking of one or more parts in the templatic affix(es) for Sanskrit reduplication, there are possibilities for considerable variation in the form(s) that this prespecification actually takes in particular cases. First, for consonants, there are specific differences (i) in the presence vs. absence of palatalization for the initial templatic C-slot corresponding to a root-initial velar consonant and (ii) in the presence vs. absence of aspiration for the initial templatic C-slot corresponding to a root-initial aspirated consonant. For instance, the root \sqrt{ghraa} - 'smell' forms a reduplicated present-stem *ji-ghraa-* whose reduplicative prefix begins with /gh/, thus showing the usual pattern of both palatalization and deaspiration--which here yields *j-*. But the root \sqrt{han} - 'smite' (which in some categories shows the variant root-form *ghan-*) has a reduplicated intensive-stem *ghanii-ghan-*, where /gh/ reduplicates as *gh-* and is thus neither palatalized nor deaspirated. Admittedly, such non-palatalized and/or aspirated reduplicated consonants in verbs³ are found only in Vedic, the oldest stage of the language, and there only in intensive stems. Still, even though

they do not occur in great numbers, such non-prespecified consonants are nevertheless well-enough represented (cf., e.g., the seven instances given in Whitney 1885b) that they must be considered a Vedic subtype within the general pattern for intensive formation. Thus, in the default case, the templatic prespecification for Sanskrit verbal reduplication may be such that the first C-slot in the reduplicative prefix is [-spread glottis, -back], but, in Vedic intensives, this C-slot may be [+spread glottis] and/or [+back].

Second, there are differences in the vocalic feature-prespecifications of Sanskrit reduplicative templates. In particular, there is no constant vowel-quality or vowel-length across all the many types of reduplication; instead, each category which is realized via reduplication has one unmarked value (and a variety of marked values) for the length and quality of the syllable rhyme in the reduplication syllable. Thus, for example, prespecified short /i/ is normal in the desiderative and the present; prespecified long /ii/ is unmarked in the aorist; an unprespecified copy of the root-vowel is expected in the perfect, and a heavy reduplication-syllable is usual in intensives.

Third, quite beyond the matter of prespecification, the various Sanskrit reduplications additionally show substantial differences in the form of the templatic affix itself. The shapes CV-, CVV-, and CVCVV- can be respectively illustrated with the abovementioned present-stem *vi-vak-* (from the root \sqrt{vac} 'speak') and the two intensive-stems *saa-smr-* (from the root \sqrt{smr} 'remember') and *ghanii-ghan-* (from the root \sqrt{han} / \sqrt{ghan} 'smite'). But there also exist templates having the form CVC-, CVCV-, VC-, VVC-, V-, or even VV-, as respectively in the intensive stems *bad-badh-* (from the root \sqrt{baadh} 'oppress') and *kari-kr-* (from the root \sqrt{kr} 'make'), the aorist stem *am-am-a-* (from the root \sqrt{am} 'injure'), the perfect stems *aan-ams-* (from the root \sqrt{ams} 'attain') and *u-vaac-* (from the root \sqrt{vac} 'speak'), and the intensive stem *ii-yaa-* (from the root \sqrt{yaa} 'go').⁴ There is thus considerable diversity in the actual form that the reduplicative template takes, in terms of the number of both consonant- and vowel-slots. Admittedly, in more recent and hence more prosodic (including more moraic) versions of Prosodic Morphology like that of McCarthy & Prince 1986-MS, such diversity can be somewhat reduced, since the number of moras in the templatic prefix is limited to a range from one to three, but it cannot be eliminated completely.

Fourth and finally, the reduplicative template in Sanskrit shows large differences in its placement. While the unmarked norm mostly involves prefixing of the reduplication-syllable, as in all the examples shown here so far, there are also reduplicated stems with infixing--and possibly suffixing--reduplication in a particular subclass of desideratives and aorists: e.g., *e-di-dh-isa-* (desiderative stem of \sqrt{edh} 'thrive'), *aa-pi-p-a-* (aorist stem of \sqrt{aap} 'obtain'--suffixal if segmented *aap-ip-a-*), and *ar-ji-h-isa-* (desiderative stem of \sqrt{arh} 'deserve', cited only in native Sanskrit grammatical literature).⁵

Despite all these differences, several pieces of evidence point to the clustering--i.e., the convergence or unity--of the various reduplication-rules in Sanskrit (note also the tendency for grammarians and linguists--of virtually all times and theoretical persuasions--to speak of "Sanskrit reduplication", as if it were a unitary phenomenon). In particular, there is first the fact that, however trivial this may seem, all the Sanskrit reduplication-templates contain at least a vowel (and also the copy-triggering feature [+reduplication], in a fully autosegmental analysis). More significantly, all varieties of reduplication in the language show the same regular contrast between two ways of copying root-consonantism with sibilant clusters. That is, root-initial S(ibilant) + (s)T(op)... clusters reduplicate as **T-vowel-ST**..., as illustrated below, but root-initial S + R(esonant)... clusters reduplicate as **S-vowel-SR**..., as also illustrated further below. Hence there is a contrast between, on the one hand, \sqrt{sthiiv} 'spew' --> *te-sthiiv* / *te-sthiiv-* (intensive stems, from native grammarians), \sqrt{sthaa} 'stand' --> *ti-stha-* (present stem), \sqrt{spr} 'touch' --> *pa-spr-* (perfect stem), *pi-sprk-sa-* (desiderative stem), \sqrt{stu} 'praise' --> *tu-stav-* (aorist stem), and \sqrt{scand} 'shine' --> *cani-scand-* (intensive stem), vs., on the other hand, \sqrt{smr} 'remember' --> *saa-smr-* (intensive stem), *su-smuur-sa-* (desiderative stem) [both from native grammarians], and \sqrt{sru} 'hear' --> *su-sraav-* (perfect stem), and *su-sruu-sa-* (desiderative stem). That this constraint is not just a general phonological one is shown by non-reduplicative -s- aorists like *a-sto-s-ta* '(s)he praised'), where two Sibilant + Stop clusters occur across a sequence of adjacent root- and suffix-morphemes. We may certainly conclude, then, that there are some unifying features evident amidst the diversity of Sanskrit reduplication.

One final feature may be adduced in order to highlight the striking extent to which both unity and diversity can be found within and among the various Sanskrit reduplications. There is an idiosyncrasy associated with five roots which begin with a palatal stop such that, when these roots occur in a reduplicated category, the initial palatal shows conversion to an initial velar--via a process referred to in most grammars as "reversion", due to the history of the segment in question. All reduplicated categories where this reversion occurs show it in the same way, i.e. with a palatal reverting to a velar, even though there are other synchronic alternations in which a palatal alternates with a retroflex consonant (e.g., the stem *raaj-* 'king' has a vocative singular *raat*). Thus, the precise form taken by the reversion when it occurs provides a unifying feature which cuts across the various reduplicative categories. On the other hand, this reversion process is not found uniformly in all the different categories, since it always occurs in the desiderative but only sporadically in the other categories which are marked by reduplication. If we group these simultaneously converging and diverging properties according to the five "reversion"-verbs in question, the results are as follows. The root \sqrt{ci} - 'note' always appears in "reverted" form (here boldfaced)--i.e., as *ci-**ke**-* (present stem), *ci-**kii**-sa-* (desiderative stem), and *ci-**kaay**-* (perfect stem). The root \sqrt{cit} - 'perceive' also shows up reverted as *ci-**ket**-* (perfect stem), *ci-**kit**-sa-* (desiderative stem), and *ce-**kit**-* (intensive stem), but native Sanskrit grammarians additionally cite the "unreverted" forms *cii-cit-* (aorist stem) and *ci-cet-* (an alternative perfect-stem). The root \sqrt{ji} - 'conquer' similarly appears reverted as *ji-**gaay**-* (perfect stem) and *ji-**gii**-sa-* (desiderative stem), but there also exist the unreverted forms *jii-jay-* (aorist stem) and *je-jiiy-* (intensive stem, from native grammarians). Finally, the root \sqrt{hi} - 'impel' likewise shows up reverted as *ji-**ghy**-* (present stem) and *ji-**ghii**-sa-* (desiderative stem, from grammarians), but this contrasts with unreverted *jii-hay-* (aorist stem, from grammarians), while the root \sqrt{han} - 'smite' only appears reverted, as *jii-**ghan**-* (aorist stem) and *jan-**ghan**-* (intensive stem).

When we total up these and the previously mentioned other differences which distinguish reduplicative subtypes across subcategories and lexical items in Sanskrit, we find that we need an extremely large number of individual templates in order to account for all the various categories and items in the language which are marked by reduplication. Even a look at a single reduplicative category reveals considerable diversity. On the following page we give, for example, a full listing of all the templates required just for the reduplicated aorist, along with an indication of how frequent each template-type is. This reduplicated-aorist category can be treated as more or less representative for the entire range of templates needed in Sanskrit. Especially noteworthy, moreover, is the fact that several roots show variation in the templates associated with them for a given category--for instance, \sqrt{pat} - 'fall' has as its reduplicated-aorist stems both *pii-pat-* and *pa-pt-*.

The Subregularities in One Sanskrit Reduplicated Verbal Category--the Reduplicated Aorist--with an Indication of Type Frequency (based on tables in Whitney 1885)

| TEMPLATE | EXAMPLES | ROOT | FREQUENCY | COMMENTS |
|--|------------------------------|-------------------------------|-----------|---|
| 1. [C V V] - [C V ...] _{ROOT} \ / comment on (3). i | pii-pat- vii-var- | √pat-'fly' √v≥r-'cover' | 73 | Default template; see |
| 2. [C V] - [C C V ...] _{ROOT} i | pi-plav- | √plu-'float' | 24 | Can be derived from (1) with ii --> i/_CC, as root always#CC-; C-reduplication subject to cluster-con- |
| 3. [C V V] - [] _{ROOT} | nuu-nu- | √nu-'praise' | 24 | Reduplication vowel is copy of root vowel; 12 roots not counted here but |
| 4. [C V] - [] _{ROOT} | su-≥su- | √su-'generate' | 22 | in (1). Reduplication vowel is copy of root vowel; 5 roots with -i- not counted here but in (5). Some could involve shortening from (3), as in (2). |
| 5. [C V] - [] _{ROOT} Different from (2) due to | di-dh≥r- | √dh≥r-'hold' | 7 | absence of root-shape constraint in template. |
| 6. [C V V] - [] _{ROOT} \ / a | vaa-v≥r- | √v≥r-'cover' | 1 | Note multiple templates for this root (also (1)). |
| 7. [V...] _{ROOT} - [V C] i | aap-ip- arp-ip- to go' | √aap-'obtain' √arp-'cause' | 2 | Could be infix reduplication if segmented aa/r-pi-p- (similar forms in other categories, especially desiderative, point to infix analysis (J&J '86)); arp- perhaps not a root <u>sensu stricto</u> but is a special root-form in causative. |
| 8. [V C] - [V...] _{ROOT} | am-am- | √am-'injure' | 1 | Like (4) but for VC-roots; could be suffixal reduplication if instead analyzed as [V...] _{ROOT} - [V C]. |

3. Meta-Templates vs. Meta-Redundancy-Rules in the Analysis of Sanskrit Reduplication.

This unity within diversity shown by the Sanskrit reduplication-templates is reminiscent of the situation which prompted McCarthy's 1979, 1981 templatic analysis of Semitic-type morphology--especially the Arabic (and Hebrew) verb-classes ("binyanim"). For Classical Arabic, e.g., McCarthy 1981:386 [(13)] first notes that, although there are fifteen binyanim (for trilateral roots), they instantiate only eight different canonical C/V-patterns: namely, (a) CVCVC, (b) CVCCVC, (c) CVVCVC, (d), CVCVCCVC, (e) CVCVVCVC, (f) CCVCVC, (g) CCVCCVC, and (h) CCVVCVC. He then points out (p. 387 [(14a)]) that these prosodic skeleta share "certain obvious regularities" which can be expressed by positing (in addition to an adjustment rule⁶) a single "tem-

plate" that "generates all and only the observed ... patterns": roughly, [(C(V))CV([+seg])CVC]. Given this precedent, we might then immediately consider whether at least the varying C/V structure of the numerous templatic prefixes required for Sanskrit reduplication can be unified in a similar fashion.

However, an approach using such a "template-generating template" is not really available for the Sanskrit case, since the variety of patterns there is collapsible only via the brute force of a curly-bracketed three-part disjunction--i.e., by something like {C(VC)V(V), V((V)C), CVC}. Simpler alternatives which overgenerate are easily imaginable (again in more prosodic--e.g., moraic--frameworks like that of McCarthy & Prince 1986-MS), but these all turn out to involve numerous ad-hoc adjustment rules which possess no independent motivation. In J&J '86, '89, we therefore adopted the processual alternative of analyzing Sanskrit reduplication as primarily an operation of V-affixation that applies both as a rule by itself and also as a part of numerous more specific rules which combine it with various other processes affixing C's and/or additional V's. In this account, Sanskrit "reduplication" is actually a set of particular reduplication-rules which can be said to cohere--as a morphological "rule-constellation"--because a "meta-redundancy-rule" of vowel-affixing reduplication "parses" as identical all the occurrences of that operation which are found in the various individual rules. Meta-redundancy-rules are here simply redundancy-statements which express the fact that a shared element of form which recurs across two or more uncollapsible rules may be evaluated as indeed the same element and so recognized as constituting (part of) one generalization. They are thus entirely parallel to lexical redundancy-rules, which can similarly be used to show that a recurrent formal identity across two or more lexical representations constitutes (part of) one generalization.

Nevertheless, as already mentioned in the Introduction, the recognition of meta-redundancy-rules in morphology effectively depends on the prior acceptance of morphological processes and hence of Process Morphology, whereas the continuing trend in Prosodic Morphology has been to exploit prosodic representations and quasi-phonological association-conventions in such a way as to eliminate or at least to minimize the role of any specifically morphological processes. We are thus led to consider whether the meta-redundancy rules of Process Morphology do not in fact have an analytically plausible and notationally feasible counterpart within Prosodic Morphology. It is our primary contention in the present paper that this can indeed be established to be the case.

In Prosodic Morphology, that is, rather than positing meta-redundancy-rules, we need only make a small, intuitively consistent extension of existing resources in order to recognize the parallel notion of "meta-templates". Rather than themselves being full templates and generating entire templates (in the abovementioned manner of McCarthy 1979, 1981), meta-templates simply state incomplete identities across templates. Thus, e.g., the unity of Sanskrit reduplication can be captured by a meta-template like [...V...] [ROOT]] (plus a supplementary annotation which governs the copying of sibilant+consonant clusters). Hence, whereas simple templates of the usual sort express the complete canonical form consistently taken by one prosodic morpheme when it is combined with different segmental morphemes (e.g., Classical Arabic 1st-binyan CVCVC shows what is shared across *katab* /kutib/ 'write (active/passive)', *fa9al* 'do', *najad* 'help', and *samam* 'poison', etc.), meta-templates express the partial canonical form consistently taken by two or more prosodic templates. In the present case, then, the [...V...] in the abovementioned meta-template for Sanskrit expresses the constant element that is shared across the entire set of reduplicative prefix-templates CV-, CVV-, CVC-, CVCV-, CVCVV-, VC-, VVC-, and V-. Indeed, a single meta-template can in this way unify the entire range of diverse simple templates required for the numerous nominal and verbal reduplications of Sanskrit. And this approach is then immediately available for expressing the unity of the various NHG umlauts--whereby we may even supplement the fronting umlauts discussed above in Section 1 with the so-called "Germanic" or raising umlaut of *e* to *i*. That is, of the three NHG umlauts illustrated by the pairs *brech-e/brich-t* '(I) break'/'(s)he/it breaks', *Brauch/Bräuche* 'custom'/'customs', and *groß/größer* 'big'/'bigger', the first raises mid front vowels, the second fronts all back vowels (while raising low ones), and the third fronts most back vowels (again raising low ones) but does not apply to /au/ or in polysyllables. Yet all three umlauts can be brought together under the single meta-template [...[...[V, -back, -low]...]ROOT...].

It must be emphasized, however, that, since meta-templates express only partial canonical forms, they do not in fact generate the actual templates of a language. That is, one cannot avoid lexically listing specific templates for particular morphological categories like those marked by

umlaut in German or reduplication in Sanskrit, even if one can use meta-templates to capture the formal similarities which exist between and among such templates. This point can be made clearer by recalling that it is not only the C/V-shape of Sanskrit reduplicative prefix-templates which varies according to category and lexical item, but also whether such templates are prespecified or not, and what their potential prespecification is. Even a cursory second look at the overview of Sanskrit reduplicated aorist-forms given above should suffice to establish the conclusion that no single representation, rule, or principle can generate the full variety of C/V-shapes, prespecifications, and positions exhibited by the subset of templates in question--much less the complete set of verbal as well as nominal templates for reduplication in the language. It is in this sense that the title of our paper mentions the underlying (dis-)unity of reduplication in Sanskrit morphology: there is much that is shared across the realizations of the various reduplicating categories, and this can be captured with meta-templates, but the fact remains that individual reduplicative templates must be lexically listed for every category and for large numbers of individual words. Nor do we feel that this situation should be viewed as particularly unusual or even at all surprising: given its inherent interaction with the lexicon, morphology is obviously that part of grammar in which we should expect to find the greatest concentration of such "local generalizations" (cf. J&J '88).

Indeed, as we have here previously suggested, analyses which involve the listing of numerous individual templates whose commonalities are expressed via meta-templates are not only implicit in the notation of Prosodic Morphology but have in fact already been tacitly employed by practitioners of that theory--and by no less a figure than McCarthy 1979, 1981. The crucial element in this regard has to do with the extreme degree of prespecification required by McCarthy's 1981:388-394 analysis of the "binyanim" in the Classical Arabic verb-system. Out of fifteen binyanim, only five (one third of the total) have no prelinked consonants, their templates thus being as follows: (I) CVCVC, (II) CVCCVC,⁷ (III), CVVCVC, (IX) CCVCVC, and (XI) CCVVCVC. As for the ten remaining, prespecified binyanim (two thirds of the total), six have one or more consonants prelinked in initial position; their templates are as follows (where, as a space-saving measure, we have represented the prespecified consonants in boldface on the same line as skeletal C's and V's, thereby replacing the C's to which they actually attach): (IV) ?VCCVC, (V) tVCVCCVC,⁷ (VI) tVCVVCVC, (VII) nCVCVC, (VIII) tCVCVC,⁸ and (X) stVCCVC. Finally, the last four binyanim must be prespecified at least for a consonant in medial position (which obviously must be linked via language-particular stipulations, rather than general principles); they have the following templates: (XII) CCVwCVC,⁷ (XIII) CCVwCVC,⁷ (XIV) CCVnCVC, and (XV) CCVnCvy.

When this set of predominantly and diversely prespecified templates for the binyanim of the Classical Arabic verb is compared with the "template" [(C, CV){CV([+seg])CVC]}--which McCarthy 1981:386-387 describes as "generat[ing]... all and only the observed canonical patterns of the binyanim"--it becomes clear that such a "template" really does not even come close to generating the full set of binyanim. Rather, it generates only C/V skeleta (and thereby the five binyanim which consist of a prosodic skeleton and nothing more). Consequently, though, McCarthy's putative "template-generating template" actually generates just parts of individual templates--as well as relating corresponding template-parts to one another--and so it is arguably a meta-template in the sense which we have introduced in this paper. Once more, we see a case where specific individual templates for particular morphological categories of a language must be lexically listed (along with a considerable amount of prespecification),⁹ whereby such individual representations can in no way be entirely generated by a single (other) representation, rule, or principle. Instead, such shared aspects of morphological structure as exist in instances of this sort must be expressed by redundancy-rule-like statements such as meta-templates.

4. Conclusions and Implications.

Although we here originally presented the prosodically tailored concept of "meta-template" as an analogue of the notion "meta-redundancy-rule" in Process Morphology, there is in fact some reason to believe that basing such a notion of redundancy-expressing statements completely or primarily on rules is insufficiently general. For example, even the early processually-oriented analysis along similar lines in Janda 1982b actually employed a template-like approach, proposing to capture recurrent formal identities across morphological processes by positing a set of lexically listed "formatives" (formal operations) which "parse" the identical portions shared by processual rules of morphology. Similar suggestions have since been made by, among others, Schmerling

1983 (concerning "operations") and Zwicky 1988 (concerning both operations and "operation types"). In Janda and Joseph 1990-MS, too, we have ourselves referred to meta-redundancy-rules as "[partial] rule-templates" within a Process Morphology framework.¹⁰ Most importantly, Frank 1991 has recently shown that there can be shared similarities of the requisite sort, not only between and among rules, but also between and among representations, as well as between rules and representations. Based partly on examples which have to do with cross-categorial (nominal and verbal) similarities like the *-i* which in Modern Hebrew occurs both in the pronoun *ani* 'I' and in past-tense forms like *zaxarti* 'I remembered', she also adopts a view of meta-redundancy-statements which is not entirely or essentially rule-based.

We conclude, then, that meta-redundancy-rule/meta-template phenomena represent an important point of possible future rapprochement (or at least approximation) between Process Morphology and Prosodic Morphology. We would further emphasize that, even with the current supremacy of "Radical Underspecification" (cf., e.g., Archangeli 1988) in phonology and many related grammatical domains, the general issue of redundancy rules has not been entirely absent from recent theoretically important discussions of major topics in these fields (cf., e.g., Halle and Vergnaud 1987: 148-153 on redundancy rules as "i[n]ternal]-rules"). Indeed, we believe that the question "Does your theory explicitly recognize redundancy rules?" is no less important and potentially revealing for all areas of linguistics than is the question "Do you believe in an eternal soul?" for discussions of human life and death. But, to end on a less grim note, we exhort our colleagues to explore further the issues raised in this paper by suggesting to them that, had Will Rogers been a 1990's morphologist, he would have said, "I never met(-)a-template I didn't like".

NOTES

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1. Given that such "meta-redundancy-rules" express partial identities across individual morphological rules, it is important that we specify what notation we are here assuming for specific processes of the latter sort. For present purposes, we employ the "Extended Word-and-Paradigm" rule-format developed by Anderson 1977, 1982, 1992 following earlier work by Matthews 1965, 1972, etc. (for a similar but slightly different format, see also Hoeksema & Janda 1988). It should further be pointed out that, even in the case of a language which is, say, exclusively suffixing but has no formal similarities across (the morphological rules inserting) its suffixes, some kind of meta-redundancy-rule will still be required in order to express the generalization that all affixes are in fact suffixes: e.g., /...X.../ --> /...X...+Y/, where Y = [-root]. And this must be true regardless of whether affixes are treated as the results of affixation rules (as above) or as lexical items inserted according to various restrictions on subcategorization--in which case there must be some meta-subcategorization requiring all affixes to follow their roots. When formulated in the latter way, it is clear that generalizations of this type are essentially parallel to those needed for expressing consistent syntactic distributions like, e.g., the fact that a language may require all of its modifiers to precede their heads. Such issues are of course much discussed in the syntactic literature by works on crosslinguistic typology (e.g., Vennemann & Harlow 1977 and Hawkins 1983) and by studies within theories like Government/Binding (GB; e.g., Travis 1984 and Speas 1990; cf. also the pre-GB treatment of Jackendoff 1977) or Generalized Phrase-Structure Grammar (GPSG; e.g., Gazdar et al. 1985). Still, the generalizations in question are rarely specified more explicitly than via a statement that they "assum[e the schemata of]... some version of X-bar theory" (cf. Pullum 1985).

2. The polysyllabic NHG adjective *gesund* 'healthy' shows umlaut in its comparative and superlative, but since this form can actually be considered to have the bimorphemic stem *ge-sund*, with a monosyllabic root, it clearly conforms to the generalization discussed in the main text (which Lieber 1987:99-111, in an otherwise thorough prosodic analysis of NHG umlaut using a floating [-back] autosegment, inexplicably fails to mention).

3. In such adverb-like nominal reduplications as abovementioned *ratha:-rathi* 'chariot against chariot' (cf. *ratha-* 'chariot'), the more extensive reduplication-pattern (one more nearly involving full words) correlates with a lack of prespecification for non-aspiration and hence parallels the length/non-aspiration correlation found with verbal reduplication in Vedic intensives. However,

while the intensive configuration is found only in Vedic, the nominal pattern is found only in the later language (i.e., Classical Sanskrit).

4. Even in the face of forms like abovementioned aorist-stem *am-am-a-* and perfect-stem *aam-ams-*, one could attempt to argue that all reduplicative prefix-templates in Sanskrit are consonant-initial by attributing such vowel-initial surface-shapes of the reduplicated prefix to the fact that the roots being copied are likewise vowel-initial (cf. \sqrt{am} - 'injure' and \sqrt{ams} - 'attain') . However, this explanation will not work for abovementioned perfect-stem *u-vaac-* and intensive-stem *ii-yaa-*, since their corresponding roots are (or can be) consonant-initial (recall \sqrt{vac} - 'speak' and \sqrt{yaa} - 'go'). As a result, it indeed appears that at least some of the templatic prefixes for Sanskrit reduplication must be vowel-initial. And of course even the just-entertained artifice of a uniformly consonant-initial reduplicative prefix cannot account for the variation in the rest of the template (...V, ...VV, ...VC, and ...VVC) which exists across the various Sanskrit morphosyntactic categories that are marked by reduplication.

5. For arguments that forms like these indeed do not involve prefixation, see J&J '86.

6. The adjustment rule at issue (V \rightarrow \emptyset / [CVC __ CVC]; McCarthy's 1981:387 [(14b)]) is in fact required because the overall "template" that generates the specific templates for the individual binyanim actually overgenerates, producing the unattested C/V skeleton CVCVCVC--which the abovementioned rule then changes to CVCCVC (identical to the skeleton given as (b) in the main text). McCarthy 1981:387, 402 argues that this syncope rule is independently motivated by an alternation in the imperfective of verbs in binyan I, but such motivation does not eliminate the redundancy involved in having two sources for the C/V skeleton shared by binyanim II and IV. The latter problem obviously disappears if McCarthy's "template-generating template" is reinterpreted as a "meta-template", as we later suggest.

7. Binyan II (along with Binyanim V, XII, and XIII) later undergoes a delinking erasure-rule that provokes reassociation, which has the effect of ensuring that there is doubling of a non-final consonant; in Binyanim II, V, and XIII, this results in a medial geminate (cf. McCarthy 1981:388-394). Binyan XII differs from XIII in that only the former shows reassociation of a root segment.

8. The prelinked *t* in Binyan VIII ends up on the surface as not the first but instead the second consonant; McCarthy 1981:389-390 achieves this effect via a rule which he dubs the "Eighth Binyan Flop". Given that this is not a phonological rule of Classical Arabic, it seems that even Prosodic Morphology is occasionally forced to engage in the unheralded use of morphological processes; a similar conclusion seems to hold for the erasure rule mentioned above in Note 7. If, alternatively, the *t* in question is prelinked in second position, then it increases the number of binyanim with medial prespecification to five (one third of the total)

9. Given that McCarthy 1979, 1981 discusses most of the prespecified consonants associated with the binyanim of the Classical Arabic verb as "affixes", and that some of these consonants are associated with a fixed prosodic skeleton, it is puzzling that he does not treat such skeletal shapes as concomitant properties of their "affixes", as Archangeli 1983 does for a parallel situation in Yawelmani. That McCarthy fails to address this issue is perhaps due to the fact that the Classical Arabic "affixes" are often medial or at least linked to what he considers the entire template for a binyan, whereas in Yawelmani the affixes discussed by Archangeli are always suffixes which can be treated as entirely external to the root C/V-skeleton.

10. Anderson 1986 has discussed such meta-redundancy rules as "meta-rules" in the sense of Generalized Phrase-Structure Grammar (GPSG), but, since the latter's meta-rules relate entire rules to one another (rather than just parts of rules) and thus can be used to generate completely new rules, it seems preferable not to equate the morphological concept here at issue with the syntactic notion employed in GPSG (cf., e.g., Gazdar et al. 1985).

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