

Dvandvas, blocking, and the associative: the bumpy ride from phrase to word*

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1 Vedic dvandvas

Sanskrit nominal compounds, highly productive at all stages of the language, are normally formed by combining bare nominal stems (sometimes with special stem-forming endings) into a compound stem, which bears exactly one lexical accent. A class of Vedic *dvandva* compounds (also known as copulative compounds, co-ordinating compounds, or co-compounds) diverge from this pattern in that each of their constituents has a separate word accent and what looks like a dual case ending.¹ They are invariably definite, and refer to conventionally associated pairs of divine or human beings, or personified natural and ritual objects.

- (1) *parjányāvātā* ‘Rain and Wind’, *mitrāvāruṇau, -ā* ‘Mitra and Varuṇa’, *mātārāpitārā* ‘father and mother’, ‘parents’, *dyāvāpṛthivī* ‘Heaven and Earth’, *indrāviṣṇū* ‘Indra and Viṣṇu’

The type rapidly recedes after the oldest stage of the language recorded in the Rigveda, and is completely superseded in Classical Sanskrit by a regularized type of *dvandva* compound which has a single accent,² no case ending on the first member, a singular, dual, or plural case ending on the second member depending on the cardinality of the compound’s denotation, and can be indefinite and inanimate.

- (2) *vātavarṣaḥ* (Sg.) ‘wind-and-rain’ (collective), *mitrabandhu(-hīna-)* ‘(without) friends and relatives’, *mātāpitaraū* (Dual) ‘father and mother’, ‘parents’, *dyurātram* (Sg.) ‘a day-and-night’, *devamanuṣyāḥ* (Pl.) ‘gods and humans’

The main synchronic puzzle about Vedic *dvandvas* is that they are like syntactic phrases built from separate words by asyndetic co-ordination in some respects, and like single words in others. One goal of my essay is to account for this mix of phrasal and lexical properties in a theoretically consistent way. My analysis builds on Stratal Optimality Theory, on Prosodic Phonology (Inkelas & Zec 1990), and on the lexicalist approach to morphological blocking (Wunderlich 1996,

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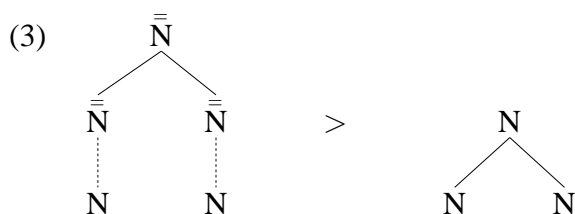
¹I believe the term ‘co-compound’ was first used by K.P. Mohanan in his study of Malayalam compounds (Mohanan 1982). Vedic *dvandvas* are also known as dual *dvandvas*, doubly dualized *dvandvas*, and *devatā-dvandvas* (‘deity-*dvandvas*’, Pāṇini 6.3.26). Wackernagel 1905, Oliphant 1912, and Ryan MS. provide overviews of the construction.

²The location of this accent is not always attested, because accent was lost in post-Pāṇinian Sanskrit, but Vedic accented texts and Pāṇini’s rule 6.1.223 agree in putting it normally on the final syllable of the second member. In a few special cases the compound is accented on its first member’s inherently accented syllable (Pāṇini 6.2.34-37).

Kiparsky 2005), and adds a measure of support for each of these theoretical proposals, as against parallel OT and Distributed Morphology.

Historically, the Vedic dvandvas' mixed status reflects an intermediate stage in their evolution from phrases to words. Notwithstanding their archaic status in Vedic, they are probably an Indic innovation, with no exact counterpart even in Iranian. Because they represent a wholly new kind of construction, anomalous within Vedic morphology in certain respects, their rise cannot be explained by ordinary analogical change. It is in fact a case of lexicalization, more specifically of the type referred to as UNIVERBATION, the merger of two or more words into one. Like grammaticalization, it instantiates a more general cross-linguistically well-documented tendency to tighter grammatical bonding.

Grammaticalization has been claimed to be a type of non-exemplar-driven analogical change, characterizable like ordinary analogical change as simplification, or optimization (van Gelderen 2004, Kiparsky in press, b). Analogous arguments can be made for lexicalization. To a bird's eye, the change from asyndetic phrasal conjunction to compounding indeed looks unproblematically like a reduction in unmotivated structural complexity.



Since dvandvas refer to specific pairs of individuals, they are semantically name-like, and their phrasal status is in that respect unmotivated. Their reduction to compound words eliminates this superfluous structure.

But zooming in on early Vedic reveals the construction in mid-change at a stage where it is an intricate blend of co-ordination and compounding. The historical record shows that the univerbation was effected in four steps, which Wackernagel (1905: 149) summarized as follows:

- (4)
- a. Co-ordinated nouns, usually dual, merge inseparably, revealing their coalescence by certain [phonological] phenomena, while still retaining the independent accentuation of both members.
 - b. The first member freezes into a fixed form.
 - c. The accent becomes restricted to the final stem syllable of the second member.
 - d. The first member receives the stem form.

Our morphological and semantic analysis of Vedic dvandvas allows a point-by-point reconstruction of these changes, explains the order in which they occurred, and shows that the process in its entirety is a simplification, which however passes through a partial or incomplete stage where it actually complicates the grammar.

Such paradoxical non-monotonic optimization trajectories are actually quite common, and they can reflect the competition between an old and a new grammar in one of two ways. Some arise from partly arbitrary patterns of variation between an original and an innovative norm. Others arise from hybrid structures which have some features of both. In both cases, the result is typically a “bump” in the path, or even several, schematically like this:

(5)



Trajectories like (5) are familiar from morphophonological analogy. A rule is typically simplified via one or more intermediate stages in which it coexists with the old one. The new form of the rule tends to apply in more productive formations (e.g. in inflection) while the old one continues to apply in less productive formations (e.g. in derivation). The rule’s “mitosis” (Kaye 1978) brings about a temporary increase in complexity (a bump in (5)). Such cases call into question the idea that analogical change and grammaticalization optimize the grammar globally by some overall measure at each step, and suggest that local optimization with respect to some structural features can be introduced even at the price of complicating the system as a whole.

To make meaningful claims about relative grammatical complexity, we need a way to quantify it. We don’t have a generally accepted one for now, and it remains to be seen whether one can be found. Classical generative grammar’s formal reduction of complexity to length is problematic in many ways, and it does not work at all in a canonical OT framework, where grammars differ only in the ranking of universal constraints. In any case, it is not clear that there is any empirical need for a global evaluation measure that evaluates the complexity of an entire grammar. This is not to say that there might not be evidence for global complexity forthcoming, perhaps in the form of evidence for tradeoffs between phonology and syntax or other components of the grammar, or abstract arguments from philosophical theories and/or mathematical models of inductive inference based on Minimum Description Length (Kolmogorov Complexity, see Li and Vitányi 1997). For now, what we can say with confidence is that there are at least two known aspects of linguistic complexity that do govern the progress of acquisition and change.

The first is the amount of *idiosyncratic information* that a given lexeme, rule, process, paradigm, or other element imposes upon the grammar of a language (understood here as including its lexicon). Other things being equal, the more idiosyncratic an element is, the later it will be learned and the earlier it will be lost or reanalyzed. How the idiosyncratic information is specified — whether in lexical entries through listing or feature specifications, by language-specific rules or constraints, by stipulated rule orderings or constraint rankings, or by a combination of these devices — is a theory-dependent question which we have to leave in its unresolved state here. For our purposes it suffices that virtually any framework of grammatical description provides *some* way of representing idiosyncrasy, from which its informational overhead can be computed.

There is also a fairly clear sense in which we can compare the relative structural complexity of *output representations*. Such a comparison is presupposed by Hawkins’ (2004) MINIMIZE FORMS principle. Formal asymmetries in the Minimalist framework, such as the preference of MERGE over MOVE proposed by Roberts and Roussou (2003) and the HEAD PREFERENCE and LATE MERGE principles of van Gelderen (2004), may turn out to be reducible to considerations of relative complexity as well, as these authors themselves suggest (see further Roberts 2007, Ch. 3, for a review of the issues and related ideas).

The two kinds of relative complexity, of grammars and of outputs, are obviously related, and for the lexicon they may largely coincide; Anttila MS. argues specifically that the complexity of a

lexical item correlates with the amount of language-specific ranking information it requires. On the other hand, neither is fully reducible to the other. Complex structures may be generated by simple grammars, and vice versa. For example, simple grammars (e.g. in an OT syntax, high-ranking FAITHFULNESS) can produce complex syntactic structures that mirror the semantics closely.

Both types of complexity are certainly needed to account for the direction of analogical change, and of the orderly growth of grammar in first language acquisition (Estigarribia 2007). In section 3 I sketch out how they may be unified in a constraint-based theory of grammar, and argue that paths like (5), including in particular the univerbation of phrasal conjunction, can be modeled by constraint reranking in Stratal Optimality Theory.

2 Phrase or word?

2.1 Vedic dvandvas are phrases

Since inflectional endings and a single accent are hallmarks of wordhood in Sanskrit, the separate case ending and accent on each constituent diagnoses a Vedic dvandva as consisting of separate words.³ Insler 1998 has supported the two-word analysis of dvandvas with a new argument from Rigvedic meter: unlike ordinary compounds, they can be placed across the caesura in a verse.

- (6) a. *śám na **índrā**//**pūśánā** vâjasātau* (7.35.1)
 ‘[may] Indra and Pūšan [bring] us success in winning rewards’
 b. *ád íd **dyāvā**//**prthivī** páry apaśyat* (3.26.8)
 ‘and he surveyed Heaven and Earth’

Insler also points out that the constituents of a dvandva can be separated, not only by clitics, but even by full words.

- (7) a. *arcan **dyāvā** námobhiḥ **prthivī*** (7.43.1)
 ‘they should venerate Heaven and Earth with obeisances’
 b. ***índrā** ha rátnaṃ **váruṇā** dhéṣṭhā* (4.41.3)
 ‘Indra and Varuṇa give the most wealth’

Such discontinuous order (“tmesis”) is the most compelling possible evidence for two-word status, because it is a robust cross-linguistic generalization that words cannot be syntactically divided (they are “syntactic atoms”).⁴

³Only one other, smaller group of putative compounds, also confined to the Vedic language, has a case ending and an accent on each member: determinative (*tatpuruṣa*) compounds with a genitive noun as first member, comprising names of gods such as *bṛhaspáti* ‘Lord of Prayer’ (Bṛhaspati), *gnāspáti* ‘Husband of the Goddess’ (Agni). Such compounds can themselves be dvandvaed with another noun, in which case the result is multiply accented: *índrābṛhaspáti* (4.49.5) ‘Indra and Bṛhaspati’. Although I will not deal with doubly accented determinative compounds here, I believe that some aspects of my morphological analysis carry over to them.

⁴Thus “tmesis” is a misnomer for such cases, for they cannot result literally from the splitting of dvandvas. The analysis of tmesis by clitics is not so clear-cut. It is also attested three times in determinative compounds with an inflected noun as first member mentioned in the preceding footnote: *śúnaś cic ché pam*, from the proper name *śúnaḥśépa* ‘Dog’s Tail’ (or maybe ‘Dog’s Penis’) (5.2.7), and *nārā ca śámsam* (9.86.42), *nārā vā śámsam* (10.64.3), from the proper name *nārāśámsa* (< **nārām-śámsa*) (‘Praise of Men’) (Agni). It constitutes less reliable evidence for wordhood than splitting by full words, for it could be explained as phonologically driven endoclitization (documented for Pashto by Tegey 1977, see Roberts 1997, Anderson 2005, Koprís & Davis MS.), especially if the constituents of dvandvas are prosodic words, as seems likely. Insler 1998 dismisses the few instances of clitic intrusion into determinative compounds as a poetic artifice, while taking the robustly attested tmesis of dvandvas, which is often of the more radical type seen in (7), as a grammatical datum which proves their unique two-word status.

In sum: accent, case, caesura, and discontinuous constituency tell us that dvandvas consist of two separate words. If they are separate words, they are presumably asyndetically conjoined into a syntactic phrase.

2.2 Vedic dvandvas are single words

However, other phonological and morphological data unequivocally shows that Vedic dvandvas constitute single words (Wackernagel 1905: 149-50, MacDonell 1910: 157).

The *ruki* rule ($s \rightarrow \text{ṣ}$ after nonlow vowels, velars, and *r*) applies regularly inside Vedic dvandvas. Only one dvandva has the requisite context, *agnīśómā*, but it occurs 21 times, always with retroflexion (1.93.8, 10.66.7, voc. 1.93.1-12 11x, 10.19.1, AV. 1.8.2, 3.13.5, 6.54.2, 6.93.3, 8.9.14, 12.4.26, 18.2.53). In contrast, the *ruki* rule never applies in asyndetic phrasal conjunction:

- (8) a. tvám̐ tám̐ brahmaṇas pate sóma índraś ca (1.18.5)
‘you, Brahmanaspati, Soma and Indra’
b. índro dyāv̐pr̥thivī́ síndhuḥ. . . (4.54.6)
‘ Indra, Heaven-and-Earth, Sindhu. . . ’
c. áditih̐ síndhuḥ pr̥thivī́ utá dyaúḥ (1.94.16 etc.)
‘Aditi, Sindhu, Earth, and Heaven’

A second phonological argument comes from vocative accentuation. In Vedic, vocatives are regularly unaccented, except at the beginning of a sentence or *pāda* (line or half-line), where they receive an accent on their first syllable, regardless of the location of the stem’s inherent accent. Vocative dvandvas invariably obey this rule:

- (9) a. sómam **indrābr̥haspatī́** píbatam (4.49.6)
‘Indra and Br̥haspati, drink the soma!’
b. **ágnīśomāv̐** imám̐ sú me śṛṇutám̐ vṛṣaṇā́ hávam (1.93.1)
‘Agni and Soma, you bulls, hear well my call’
c. **indrāvaruṇā́** mádhumattamasya vṛṣaṇaḥ sómasya vṛṣaṇā́ vṛṣethām (6.68.11)
‘Indra and Varuṇa, you bulls, quaff this sweet, strong soma!’
d. samrājāv̐ asyá bhúvanasya rājatho // **mítrāvaruṇā́** vidáthe swardṛśā́ (5.63.2)
‘as absolute rulers you rule over this world, Mitra and Varuṇa, in wisdom, in sight of the sun’

In contrast, each of a series of syntactically conjoined vocatives usually counts as a separate phrase:⁵

- (10) a. **váruṇa mítrāryaman** vársiṣṭhaṃ kṣatrám̐ āśáthe (5.67.1)
‘you have achieved supreme rule, Varuṇa, Mitra, Aryaman’
b. **ágna índra váruṇa mítra dévāḥ . . .** (5.46.2)
‘Agni, Indra, Varuṇa, Mitra, gods’

⁵The accentual contrast is somewhat blurred by occasional instances where even asyndetically coordinated singular vocative phrases are treated as a single unit, e.g. *br̥haspata índra* (4.50.11) ‘Br̥haspati, Indra!’. However, such cases are rare, and there are no exceptions in the other direction. Thus, the accentual criterion does draw a distinction between dvandvas and co-ordinated phrases.

- c. máhi vo mahatám ávo // **váruṇa mítra** dāsúṣe (8.47.1)
 ‘great is your protection, Varuṇa, Mitra, great ones, for the sacrificer’

These accentuation and retroflexion data show that dvandvas form a tighter unit than phrasal co-ordinations, at least as far as prosodic constituency is concerned. If dvandvas are single words, this contrast follows. If they consist of two conjoined words, it is not clear how they can be distinguished from phrasal conjunction.

The two-word alternative can also be excluded on morphological grounds. Dvandvas serve as stems for the derivational suffixes *-vat* (*-vant*), *-a*, *-ya*, and *-ta-* (*-tā*):

- (11) *mitráváruṇavat-* (8.35.13) ‘accompanied by Mitra und Varuna’, *dyāvāpṛthivivat-* ‘accompanied by sky and earth’ (AV. 19.18.5), *maitrāvaruṇá-* (AB. etc.) ‘relating to Mitra und Varuṇa’, *maitrāvaruṇátā* ‘property of being M. and V.’ (TS.), *maitrābārhaspatyá-* ‘belonging to M. and B.’ (ŚB.)

Since these suffixes otherwise take single nominal stems as inputs, the data in (11) is inconsistent with a phrasal analysis of dvandvas.

The point is reinforced by the accentuation of these derivatives. The suffixes *-a*, *-ya*, *-ta*, are accentually dominant, in that they eliminate the accents off the entire compound and attract it onto themselves (or in the case of *-ta*, onto the preceding syllable). No affix triggers this morphological accent deletion rule on anything larger than a word.⁶

It might be objected that most of the words in (11) are from the post-Rigvedic literature, and so might reflect a later stage of the language. But they are still morphologically based on the old-style dvandvas of the *mitráváruṇa-* type, double-accented and with the first member ending in the apparent dual *-ā*, *-ī*. Therefore, they do provide evidence that these old-style dvandvas got treated as single words *before* they were morphologically regularized into ordinary stem-based single-accented dvandvas in later Vedic and Classical Sanskrit.

Vedic dvandvas obey two other restrictions that differentiate them from phrasally conjoined structures (as well as from later dvandvas). They are always binary, whereas phrases can have three or more co-ordinate members (as in (8) and (10a,b))⁷. And they are always definite, the majority functioning as proper names, with a smaller group denoting kinship relations and personified natural phenomena. The definiteness restriction is likewise unique to the Vedic dvandvas.⁸

It is worth mentioning here that dvandvas are largely irreversible,⁹ though this does not get us much further because the order of classical dvandvas and of phrasal conjuncts is usually also fixed.¹⁰

⁶It is a process of the lexical phonology; as argued by Kiparsky 1984 for Vedic, and Kiparsky 2003 for Greek.

⁷As can regular dvandvas of the classical Sanskrit type: *ḥṣatra-ṣiṭ-śūdrāḥ* (the three non-Brahmin castes), *eco* ‘y-av-āy-āv-aḥ’ *eC* is replaced by *ay*, *av*, *āy*, *āv*’ (Pāṇini 6.1.78).

⁸Contrast phrasal conjunction, e.g. *ḥṣāpa usrā* (6.52.15) ‘nights and mornings’, and classical dvandvas, e.g. *dadhi-ghṛtam* ‘yoghurt and ghee’.

⁹There are just two cases where both orders are attested: *dyāvāpṛthivī* (65x) ~ *pṛthivīdyāvā* (1x), and *náktoṣāsā* (5x) ~ *uṣāsānákta* (8x). Another instance of reversal, *vātāparjanya* (10.66.10, AV. 10.4.16, pro *parjanyavātā*) is chronologically a later form than *parjanyavātā*, and represents the innovative later type of dvandva with a single accent, discussed in section 3 below.

¹⁰For the order of members in classical Sanskrit dvandvas see Pāṇini’s rules 2.2.32-34; similar generalizations fix the order of members in Greek verbal dvandvas (Kiparsky in press, a) and in the much studied “irreversible binomial” phrases (for English see most recently Benor and Levy 2006).

Suppose we accept on the strength of the above data that dvandvas are words, consisting of a compound stem inflected with a case/number ending. What are the constituents of the compound stem? We have already seen that the second member, at least, is itself a bare stem. It appears as such in derivatives like (11), e.g. *mitrāvāruṇa-*. Therefore the dual case endings on the second member (-ā, -bhyām, etc.) are not part of the compound stem. They are added to the bare compound stem at the inflectional level, in the same way as they are added to any stem. When the compound takes a derivational ending, no case ending appears on it.

What about the first member? The presumption is that it is likewise a stem, its dual-like ending notwithstanding, for otherwise we would have to countenance a process of Word+Stem compounding, which is typologically at least rare. Its stem status is confirmed by several independent bits of morphological evidence. The ending is invariant -ā (in -ī, if it is an *i*-stem) regardless of the syntactic role and inflection of the compound itself, as shown by its case inflection in (12):

- (12) a. Genitive Dual *indrāvāruṇayoḥ* (1.17.1, AV. 10.5.11 etc.)
 b. Instrumental Dual *mitrāvāruṇābhyām* (5.51.9), *indrāgnībhyām* (8.40.5), *somāpūṣābhyām* (2.40.2), *agnīṣomābhyām* (AV. 12.4.26)

and by its number inflection in (13):

- (13) a. Vocative Plural *indrāmarutaḥ* (2.29.3) ‘Indra and the Maruts’ (a set of more than two)
 b. Nominative Plural *dyāvāprthivīḥ* (AV. 8.9.16) ‘the heaven-and-earths’ (a set of six)

Only the second member has the syntactically appropriate inflection, with oblique case if the syntax so requires, and a plural rather than a dual ending if the compound denotes more than two things. If the construction consisted of two syntactically co-ordinated words, then both its members should receive the same case/number endings. Instead, the data indicate that case is assigned only to the whole compound *qua* inflected stem, and that the -*V̄* ending of the first member, etymologically a Nominative/Accusative Dual, has become frozen into a stem-forming (compositional) suffix. I will call it the ASSOCIATIVE SUFFIX, for reasons that will become clear when we get to its semantics in section 2.8 below.¹¹

This conclusion is corroborated by the allomorphy of the ending, or rather by its non-allomorphy. The regular N.A. Dual case ending has, in addition to the ending /-ā/, a variant /-āu/¹² (appearing 293 times in the Rigveda, Renou 1952: 188). The first member of dvandvas, however, always ends in /-ā/. For example, we find both *mītrāvāruṇau* (15x) and *mītrāvāruṇā* (68x), but never **mītrauvāruṇau* or **mītrauvāruṇā*. If the first member of a dvandva were simply one of two co-ordinated dual nouns, the dual ending would manifest an odd kind of syntactically governed allomorphy: the variant /-āu/ could appear on the second conjunct of a phrase but not on the first. If I am right that the ending on the first member has been grammaticalized as a separate associative suffix, then we need only specify the associative morpheme as /-ā/.¹³

In sum: phonology and morphology warrant the conclusion that dvandvas are built by putting together two stems (not two inflected words) into a compound stem, which then, like other stems, can receive either derivational or inflectional endings. In this respect, Vedic dvandvas are built like all other Sanskrit compounds.

¹¹The reanalysis of a case ending to a stem-forming suffix in compounds is common. For example, the *-es* in German *Liebesbrief* ‘love letter’ is etymologically the Genitive Singular ending, but synchronically builds a compositional stem; the Genitive Singular of the noun is actually *Liebe*.

¹²Pronounced -āv before a vowel within a *pāda*, and -ā before *u*.

¹³This is how Pāṇini’s rule 6.3.26 *devatādvandve ca (ān)* treats the Vedic dvandvas.

2.3 Resolving the contradiction

Applying the criteria for wordhood has given us contradictory results for Vedic dvandvas. By the tests in 2.1, they contain two co-ordinated words. By the tests in 2.2, they are single words consisting of a compound stem plus an inflectional ending, just like ordinary Sanskrit compounds.

In principle, there are several approaches to resolving such a contradiction.

Dvandvas could be a hybrid formation, with a mix of phrasal and lexical characteristics. Evidence that wordhood must be decomposed into partly independent bundles of properties has been accruing as linguistic descriptions have become more fine-grained, and linguistic theory now provides several (not necessarily incompatible) ways of bundling them. It has been noted for many languages that the “words” relevant to prosodic constraints and operations are not always the same as the “words” relevant to morphological constraints and operations. This discrepancy is modeled in Prosodic Phonology by referring morphology and phonology to distinct independent constituent structures, one representing MORPHOLOGICAL WORDS, the other PHONOLOGICAL WORDS (Inkelas 1989, Inkelas and Zec 1990). Both representations constitute a complete top-to-bottom hierarchical organization for a sentence. In the default case, morphological words coincide with phonological words, but the grammar can stipulate mismatches between them under specific conditions. In addition, the two structures differ formally in certain ways (for example, morphological/syntactic categories are recursive).

The stratal hierarchy (“level ordering”) complicates the concept of “word” in another way. It provides a distinction between the LEXICAL WORD and the POSTLEXICAL WORD, the latter typically a larger unit (one which includes clitics, for example). This distinction is defined in derivational terms and applies to both phonology and morphology, predicting certain interactions and correlations between them.¹⁴ Proponents of Lexical Phonology/Morphology and of Stratal OT have argued that this division is required in addition to the one imposed by Prosodic Phonology.

Independent of enriched representations is the possibility of a constructional mitosis — that there are simply two distinct coexisting types of dvandvas in Vedic, one derived lexically, the other syntactically, with correspondingly different characteristics.

It is indicative of the Vedic dvandvas’ morphological intricacy that we will need all three of these ideas in order to make sense of their conflicting properties.

First, the recognition of two distinct coexisting structures is all but inevitable given the data of the preceding section. Recall that the conjunction ‘Mitra+Varuṇa’ *must* be a one-word compound stem when it is an input to morphology, as in (11) and (12):

- (14) **mitrāvāruṇavantā** utá dhārmavantā marútvantā . . . gachatho hávam (8.35.13)
‘accompanied by Mitra and Varuṇa, by Dharma, by the Maruts, you two come’

and it *must* be two separate words when it constitutes a discontinuous phrase in examples like (7), e.g.:

- (15) cáksur máhi **mitráyor** ām éti priyám **vāruṇayoḥ** (6.51.1)
‘there comes the great friendly eye of Mitra and Varuna’

¹⁴Yet another type of hybrid category, probably not relevant for the dvandva problem, straddles traditional word classes such as verbs and nouns; Vedic examples might be the deverbal nouns that are verblike in assigning accusative or some other oblique case to their complements.

The coexistence of the two structures is not in the least surprising because just about *every* type of lexical compound in Sanskrit has a potential syntactic paraphrase made up of the same lexical material.

- (16) a. *viśpátih* ‘clan chief’ (10.135.1) — a compound
b. *viśás pátih* ‘chief of the clan’ (10.152.2) — a phrase
c. (*viśvāsām*) *viśám pátih* ‘chief of (all) the clans’ (6.15.1) — a phrase

Since the same grammatical relation can so often be expressed both morphologically as a compound and syntactically as a phrase, it would be strange if conjunction also could *not* be grammatically expressed in both these ways:

- (17) a. *mitráváruṇayoḥ* ‘Mitra and Varuṇa’ (Gen.Du.) — a compound
b. *mitráyoḥ . . . váruṇayoḥ* ‘Mitra and Varuṇa’ (Gen.Du.) — a phrase

Dvandvas differ from other compounds only in that they so often look exactly like their syntactic paraphrases.

So our first step towards a resolution of the contradiction is that the so-called Vedic dvandvas really are of two distinct types: syntactically generated asyndetic co-ordination structures (i.e. phrases rather than compound words), and lexically generated compound words formed by combining two stems into a compound stem, which then undergoes derivation or inflection. Split conjuncts and multiply inflected conjuncts are of the former type. On the other hand, all dvandvas which have derivational affixes, or which have the syntactically relevant inflectional ending only on their second member, or with any of the other single-word properties reviewed in section 1, are derived lexically.

This solves half the problem. The syntactic dvandvas are just normal asyndetic co-ordination structures of the language, and need no further discussion until we get to the semantics of the dual. The lexical dvandvas, however, have some unique quasi-phrasal features not found in any other type of compound. The next sections are devoted to them.

2.4 The structure of lexical dvandvas

Historically, the lexical dvandvas’ phrasal features are residues of the syntactically conjoined phrases from which they originate. From the synchronic point of view, these features are not merely a random collection of anomalies. They bundle in a way which can be accounted for by the assumption that lexical dvandvas are single *morphological* words that consist of two *phonological* words (as argued already by Han 1994).

Prosodic Phonology tells us that morphological rules and constraints refer to morphological units, and phonological rules and constraints refer to phonological units. The Vedic data bears out this predicted division of labor. Morphologically conditioned operations, such as derivational affixation and vocative accentuation, are defined on morphological words, whereas the phonological single accentuation constraint is imposed on phonological words, and caesuras are allowed at phonological word boundaries.

When the phonological and morphological structures don’t match, it can happen that the caesura is placed in the middle of a morphological word — in fact, in the middle of a morphological stem, as in (18).

- (18) a. virāṅ **mitrá//várūṇayor** abhiśrīḥ (10.130.5)
 ‘Viraj was the privilege of Mitra and Varuṇa’
 b. saḵúr **mitrá//várūṇābhyām** (5.51.9)
 ‘together with Mitra and Varuṇa’

They must be single morphological words because their first member has no case,¹⁵ but two phonological words, each endowed with its own word accent, lying athwart the caesura.

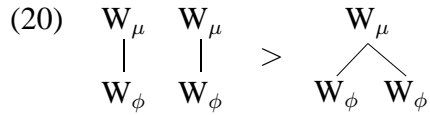
But what about the *ruki*-rule? Since it is a phonological rule, Prosodic Phonology tells us that its domain must be phonological. So we would expect it to apply only within phonological words, and yet it applies in dvandvas across what we have concluded are phonological word boundaries (section 2.2). The key to the solution is that the *ruki*-rule in Vedic applies to *postlexical words*. That is, its domain includes also words created by postlexical restructuring processes, such as cliticization. It applies across clitic boundaries to initial *s-* in particles, pronouns, and certain verbs, mostly unaccented light verbs, provided of course the preceding word provides a *ruki*-triggering context (Wackernagel 1896: 237). It also applies to full lexical words preceded by a particle or preposition that ends in a *ruki*-trigger. It hardly ever applies across ordinary full-fledged word boundaries between content words ((19g) is a rare exception).

- (19) a. nahí **ṣma** (8.7.21) ‘not then’
 b. rátho hí **ṣáh** (1.54.3)
 ‘for he was the charioteer’
 c. yuvám kaví **ṣthah** (10.40.6)
 ‘you two are wise men’
 d. asmé tát indrávaruṇā vásu **ṣyāt** (3.62.3)
 ‘may that good be ours, Indra-and-Varuṇa’
 e. ghnánto vítrāṇi sūrībhiḥ **ṣyāma** (7.92.4)
 ‘with such sacrificers, may we kill the enemies’
 f. sóma u **ṣuvāṇáh** sotṛbhir ádhi **ṣnúbhir** ávīnām (9.107.8)
 ‘soma is pressed by the pressers on the backs of the sheep’
 g. gauryām . . . padí **ṣitām** ámuñcatā (4.12.6)
 ‘he freed the Gauri cow, whose legs were tied’

This is clear evidence that the *ruki*-rule applies within *phonological* words, just as the theory predicts (and not within *morphological* words) but that it applies even to those phonological words which are formed postlexically through cliticization. If the *ruki*-rule in Vedic is a *postlexical word-bounded* rule, its domain includes the outputs of cliticization and univerbation. And exactly this is what I have elsewhere argued for on the basis of quite independent data having to do with the application of *ruki* in reduplication (Kiparsky 2007).

With this understanding, we can reconcile even this last diagnostic with the theory. In the lexical phonology, dvandvas are two phonological words, as we have supposed, but they are *merged into one phonological word in the postlexical phonology*. Letting W_μ and W_ϕ stand for morphological and phonological word, respectively, the following postlexical restructuring takes place.

¹⁵That is, they bear the associative dual stem suffix, on my analysis. On the traditional analysis, they just have the “wrong” case. Either way, there can be no question of syntactic co-ordination here.



Crucially, the constraint that limits a phonological word to only one lexical accent *does not apply to postlexical words*. We know that already from other, much simpler facts. For example, postlexical words with two or more accents routinely arise when sandhi merges lexical words:

- (21) a. *sá devā́m éhá* vakṣati (1.1.2) Derivation: /á ihá/ → [éhá]
 ‘he will bring the gods here’
 b. *távét* tát satyám (1.1.6) Derivation: /táva ít/ → [távét]
 ‘that is your truth’

Therefore, when a dvandva is reparsed as a single phonological word postlexically, its accents remain.

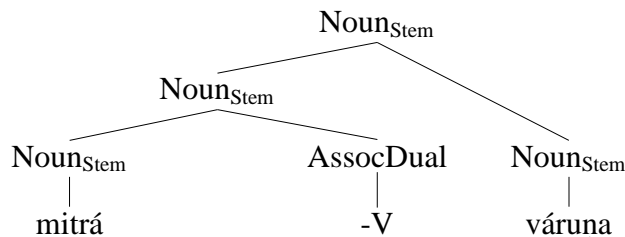
Our analysis of lexical dvandvas now captures every aspect of their apparently inconsistent behavior.

- (22) a. Morphology refers to morphological units:
 1. Inflectional and derivational affixation: dvandvas are single stems.
 2. Vocative deaccentuation: inflected dvandvas are single morphological words.
 b. Phonology and meter refers to phonological units:
 1. Single accentuation: dvandvas are two phonological words at the lexical level.
 2. Caesura placement: dvandvas are two phonological words at the lexical level.¹⁶
 3. The *ruki*-rule: dvandvas are single phonological words at the postlexical level.

2.5 A derivation

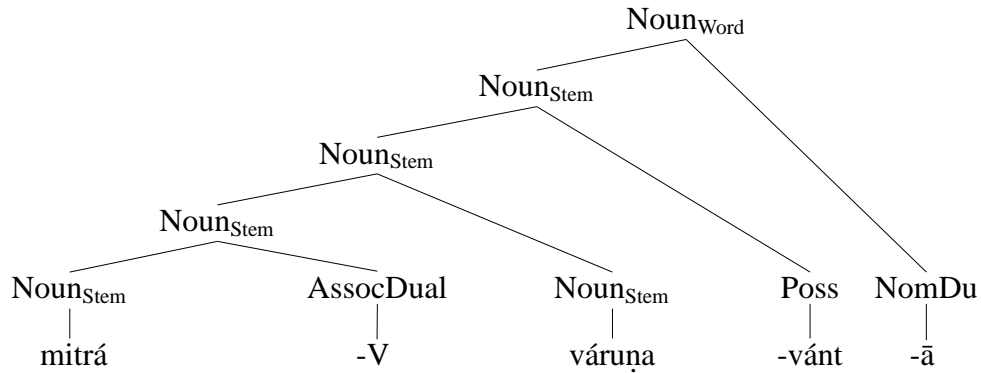
I illustrate the morphological derivation of Vedic dvandvas with the example *mitráváruṇavantā* (8.35.13) ‘accompanied by Mitra and Varuṇa’ (Instr.Sg.), a case-inflected adjective derived from a dvandva. Its morphological derivation proceeds as follows. (I have simplified and telescoped the steps in various harmless ways). Trees mark morphological constituency and brackets (... [...]_w ...) mark prosodic constituency.

- (23) a. Formation of dvandva stem *mitráváruṇa-*

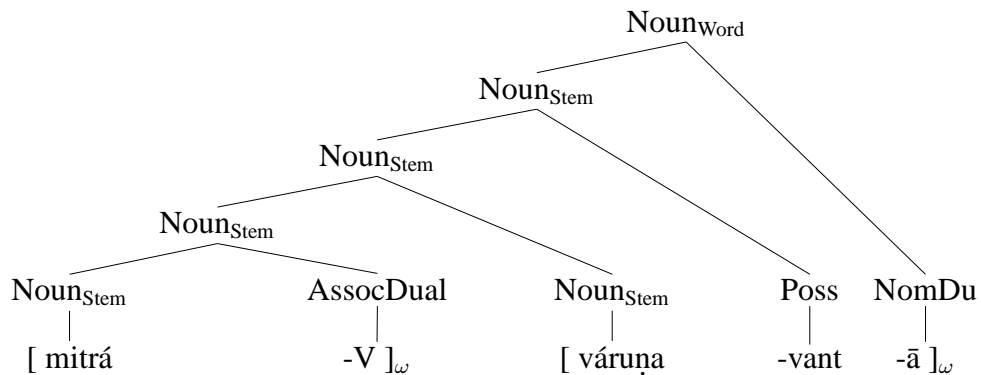


¹⁶More precisely, the data show that caesura placement *can* treat dvandvas as two phonological words at the lexical level, not that it *always* does. Generally, metrical constraints can be enforced either on lexical representations or on postlexical representations in Vedic versification. An example is contraction of vowels across word boundaries: \bar{V} from /-V V-/ sometimes counts as two syllables, sometimes as one. This is comparable to the fact that words like *being* and *rhythm* can count as two syllables or one in English poetry.

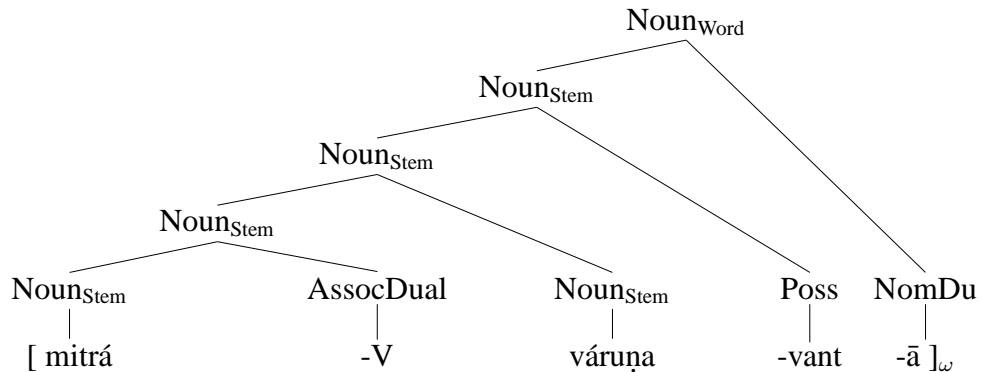
b. Affixation of derivational *-vant* and Instr.Sg. *-ā*



c. Prosodic parsing into phonological words (... [...]_ω ...). The associative morpheme coerces the stem it attaches to into a phonological word; hence (by strict layering) the second member of the compound stem is a phonological word also. All but the first accent is erased within each phonological word. This is referred to in the literature as the Basic Accentuation Principle (BAP).



d. Postlexically, the compound is restructured into a single phonological word, in obedience to the constraint requiring alignment of morphological words with phonological words, neither affecting nor affected by the double accentuation (since the single-accent constraint on words is not active postlexically).




In terms of an OT grammar, the prosodic reparsing as a single phonological word involves a constraint reranking. A fuller presentation in diachronic perspective follows in section 3, but for

now let us simply note that the prosody/morphology interface for Vedic dvandvas can be characterized by the two general constraints (24a,b) plus an idiosyncratic morpheme-driven constraint (24c) which corresponds to the associative suffix's idiosyncratic property of imposing phonological word status on its stem.

- (24) a. $W_\mu \subseteq W_\phi$ (A phonological word must contain a morphological word.)
 b. $*W_\mu W_\mu$ (Minimize the number of phonological words.)
 c. $-\bar{a}]_{W_\phi}$ ($-\bar{a}$ is aligned with a phonological word)

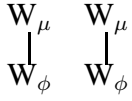
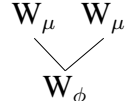
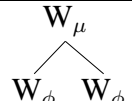
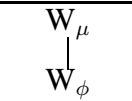
In the Vedic lexical phonology, the constraint (24a) which requires that a phonological word contain a morphological word is dominated by the other two constraint, and hence violated when they must be satisfied, which is precisely in dvandva compounds.

- (25) Vedic lexical phonology: $*W_\mu W_\mu, -\bar{a}]_{W_\phi} \gg W_\mu \subseteq W_\phi$

		$*W_\mu W_\mu$	$-\bar{a}]_{W_\phi}$	$W_\mu \subseteq W_\phi$
1.	$\begin{array}{cc} W_\mu & W_\mu \\ & \\ W_\phi & W_\phi \end{array}$	*	✓	✓
2.	$\begin{array}{c} W_\mu \quad W_\mu \\ \diagdown \quad \diagup \\ W_\phi \end{array}$	*	*	✓
3. 	$\begin{array}{c} W_\mu \\ \diagup \quad \diagdown \\ W_\phi \quad W_\phi \end{array}$	✓	✓	*
4.	$\begin{array}{c} W_\mu \\ \\ W_\phi \end{array}$	✓	*	✓

Lexical phonological rules apply to this representation. In the postlexical phonology, the constraint $W_\mu \subseteq W_\phi$ is promoted, triggering prosodic restructuring of dvandvas into single words. Postlexical phonological rules (such as the *ruki*-rule) apply at that point.

- (26) Vedic postlexical phonology: $W_\mu \subseteq W_\phi, *W_\mu W_\mu \gg -\bar{a}]_{W_\phi}$

	$W_\mu \subseteq W_\phi$	$*W_\mu W_\mu$	$-\bar{a}]_{W_\phi}$
1. 	✓	*	✓
2. 	✓	*	*
3. 	*	✓	✓
4. 	✓	✓	*

2.6 The ambiguous cases

Now for the hardest part of Insler’s question “*mitrāvāruṇā* or *mitrā vāruṇā*?”. What about ordinary adjacent pairs which could be either lexical or syntactic? For most dvandvas in the texts, the two parses are string-identical.¹⁷

- (27) **mitrāvāruṇā** huve (1.23.5)
‘I call on Mitra and Varuṇa’

Are they morphological words, or syntactic phrases? How can we tell? Does it matter?

Application of the abovementioned phonological diagnostics to the indeterminate cases reveals that they consistently count as single words (*mitrāvāruṇā*, not *mitrā vāruṇā*). For adjacent duals that are morphologically ambiguous between compound and phrase, the phonological criteria, wherever applicable, point to the one-word structure, not to the phrase. For example, the phrasal conjunction option predicts that there should be syntactically conjoined sequences of dual vocatives with separate accents such as **mitrā vāruṇā* ‘O Mitra-Dual, O Varuṇa-Dual’, parallel to singular sequences like (10c). But, with noun pairs that allow compounding, such sequences never occur. The vocatives are always unaccented, of the type *mitrāvaruṇā*, and *mitrāvaruṇā* in line- and *pāda*-initial position.

Similarly, *agnīśómā* invariably has *-ṣ* from the *ruki*-rule, in accord with the lexical analysis. If there were any phrasally conjoined instances of this surface string, they would show up as **agnīśómā* because the *ruki*-rule is inapplicable across the boundary between two lexical words. But no such cases are attested.

The phonology, then, indicates that morphologically ambiguous cases are normally lexical compounds. How is this to be accounted for formally? It is not possible to rule out the homonymous syntactic derivation directly in the grammar, for it must be available to generate the unambiguously phrasal constructions (such as the discontinuous instances). No reasonable syntactic

¹⁷The spaces in romanized transcriptions are purely conventional and have no counterparts in the Sanskrit recited or written text.

constraint on conjunction can rule out precisely those conjoined phrases that *look* like they *could be* compounds. But they can be ruled out *indirectly* by a principle which selects the simplest of a set of competing synonymous forms, in this case a compound over a phrase with the same form and meaning. It is a classic BLOCKING effect, motivated by economy of output structure.

2.7 Blocking

My treatment of blocking follows Wunderlich 1996 in positing two components of grammar, a GENERATIVE COMPONENT and a BLOCKING MECHANISM. The generative component specifies the potential expressions of the language and their potential interpretations, and the blocking mechanism functions as a filter that resolves the competition between the potential expressions whose meaning is compatible with a given input meaning (the ‘intended meaning’) and sorts them into the optimal paradigms. FAITHFULNESS ensures that every cell is filled, and MARKEDNESS ensures that it is filled only by one form, the simplest one that the generative component supplies.¹⁸ Importantly, blocking is not a morphology-internal relation, but holds between competing expressions of whatever kind, thereby generating the kinds of paradigms composed of a mix of analytic (morphological) and periphrastic (syntactic) forms that are ubiquitous in language. The availability of blocking simplifies the generative component by reducing many apparently arbitrary combinatoric restrictions to blocking effects.¹⁹

A familiar English example will serve to illustrate how morphology blocks syntax. The syntax of English generates not only the expressions *John didn’t leave*, *Did John leave?*, *Didn’t John leave?*, but also *(*)John did leave*. Unless its auxiliary is stressed, *did leave* is superseded (“blocked”) by the competing simpler expression *left*, which is generated by the morphology. The one-word expression *left* prevails over the two-word expression *did leave*, unless other factors, such as emphasis on the auxiliary *did*, prevent it.²⁰ This obviates the need for ‘Affix-hopping’ and similar operations that have been posited from *Syntactic Structures* down to Distributed Morphology.

For Sanskrit, the perfect furnishes a similar example. Morphological perfects are formed from most simple verbs, e.g. *cakāra* ‘has done’, from *kṛ*. Derived verbs don’t allow morphological perfects, nor do simple verbs of certain phonological shapes, e.g. V-initial superheavy roots. No verbs that allow morphological perfects allow periphrastic perfects (**karāṃ cakre*, **kṛṇavāṃ cakre* ‘has done’). Conversely, all verbs which don’t allow morphological perfects do form periphrastic perfects, e.g. *mṛgāyāṃ cakre* ‘has hunted’ (*mṛgā-ya-* ‘hunt’ is a derived verb), *īkṣāṃ cakre* ‘has seen’ (*īkṣ* ‘see’ is a superheavy root). As a result, each verb has one and only perfect, with simple and periphrastic forms in complementary distribution together constituting a PARADIGM.

Paradigmatic blocking arises through the interaction of FAITHFULNESS and MARKEDNESS. When the simple forms are precluded, by phonological or other constraints, the periphrastic forms automatically fill the gap. A simplified constraint system will serve to illustrate the idea.

(28) a. REDUPLICATION: Superheavy roots beginning with a vowel don’t reduplicate.

¹⁸The full story also covers semantic blocking; see Kiparsky 2005 for illustration with Sanskrit examples. Wunderlich makes a number of further assumptions, which together define the theory that he calls Minimalist Morphology. These additional assumptions will also not be required here. Any theory of morphology which is lexicalist and which treats blocking as a relation between expressions will serve equally well.

¹⁹Usually, it turns out that morphemes are combined freely subject only to general constraints on word structure. For example, affixes can be added whenever their feature content unifies with the feature content of the base and directionality requirements (represented by alignment constraints or perhaps in some other way) are satisfied.

²⁰For instances of such systematic blocking in various parts of Vedic morphology, see Kiparsky 2005.

- b. FAITHFULNESS: Express the meaning of the input.
- c. MARKEDNESS: Avoid complexity (for present purposes: minimize the number of words).

The blocking mechanism must adjudicate between three candidates that the generative component offers for a given paradigmatic cell in the perfect paradigm: the analytic (one-word) form, the periphrastic (two-word) form, and the null form (a paradigmatic gap). The following tableau shows how the one-word form defeats the periphrastic form by MARKEDNESS and the paradigmatic gap by FAITHFULNESS (set A), and how the more complex periphrastic form steps in when phonology blocks the one-word form (set B).

(29)

		REDUPLICATION	FAITHFULNESS	MARKEDNESS
A	1. \Rightarrow <i>ca-kār-a</i>			*
	2. * <i>kar-ām cakre</i>			**
	3. \emptyset		*	
B.	1. * <i>i-īkṣ-a</i>	*		*
	2. \Rightarrow <i>īkṣ-ām cakre</i>			**
	3. \emptyset		*	

Paradigms, on this view, are not listed, or directly generated by rules or constraints, and they are not primitives of the theory; rather, they emerge through the blocking mechanism from the competition between expressions. Inflectional and productive derivational categories typically form paradigmatic subsystems constituted by blocking.

The lexicalist approach with blocking is more restrictive than Distributed Morphology because the latter provides both a kind of blocking, which every theory needs in any case, and an additional unnecessary set of morphological operations (adjunction, metathesis, and the like). It allows in principle for treating the Sanskrit and English cases either by blocking, or by a movement process in Affix-Hopping style, which merges the perfect with the root to form the inflected form. But this alternative is never needed, and in most cases demonstrably wrong. It misses the generalization that the conditions that determine the distribution of simple and periphrastic forms are always more perspicuously stated on the simple form. For example, in Sanskrit there are obvious morphophonological reasons why superheavy V-initial roots and derived roots do not reduplicate,²¹ but would not at all be clear why the complement of that class should resist Affix-Hopping. Similarly, in English it is much easier and more natural to state the distribution of the comparative and superlative in terms of a restrictions on the distribution of *-er* and *-est* than in terms of a restrictions on the distribution of *more* and *most*. Distributed Morphology has no explanation for this generalization.

FAITHFULNESS will require the synthetic expression if it provides extra information which is part of the intended meaning (the “input” in the OT tableau). For instance, *John did leave* is acceptable when it expresses an extra component of focus meaning that *John left* does not express, in which case FAITHFULNESS selects it when that component of meaning is part of the input. In general, outside of paradigmatic subsystems there is usually no complete synonymy between expressions, and consequently no categorical blocking. For example, *descend* does not block the

²¹The former is excluded because the reduplicant would contract with the root and the result would be identical to the root itself. The latter is excluded because perfect reduplication is an operation on roots and not on stems, as independently attested by the phonological shape of the reduplicant.

hyponymous *go down* and *come down*, *glass shelf* does not block the hyponymous *shelf for glass*, *shelf for glasses*, *shelf of glass*, etc. Although Sanskrit usage at all stages favors compounds over their analytic paraphrases, so that a compound (if it is grammatically possible at all) is almost always the more frequent option, and often the only attested option,²² phrasal equivalents sometimes do occur. For example, the compound *viśpāti* ‘clan chief’ (see (16)) occurs 31 times in the Rigveda, but the phrase *viśás páti* ‘chief of the clan’ is also found twice, and *viśám páti* ‘chief of the clans’ occurs three times. One reason to choose the full phrase may be to express the number feature on the complement, which is neutralized in the compound. Moreover, in three of the cases the phrasal construction is grammatically unavoidable because the genitive is modified by an adjective.

Since the dvandva compounds are dual, they are equivalent to the corresponding phrase in their number features. In this case, the syntactic construction is evidently not motivated by the need to express some extra semantic content as in (16). The phrasal construction might sometimes be motivated by the need to modify just one of the conjuncts. For example, the reason the conjuncts are separated in (30) may be so that the epithet *tuvijāta* should refer specifically to Varuṇa, as in 2.27.1, 2.28.8 (it never applies to Mitra).²³

(30) prá **mitráyor váruṇayoḥ** . . . *tuvijātáyoh* (7.66.1) ‘for Mitra and strong-natured Varuṇa’

But for the most part dvandva compounds should block the corresponding string-identical phrases, as indeed they do.

A similar instance of blocking arises in preverb+verb combinations, which are structurally ambiguous for similar reasons as dvandvas. Their separability (“tmesis”, see (31b)) shows that they can be combined as separate words, one of which can then be syntactically moved. But they can also be combined lexically, for a preverb+root combination also functions as an input to morphological affixation, including the formation of the absolutive, which results in single-word compounds like (31c), where tmesis as in (31d) is quite impossible.²⁴

- (31) a. *īlābhiḥ sām rabhemahi* (8.32.9) ‘may we get hold of abundance’
 b. *sām iṣá rabhemahi* (1.53.4) ‘may we get hold of food’
 c. *samrábhyā* (10.94.4) ‘having got hold of’
 d. **sam iṣá rábhyā* ‘having got hold of food’

As in the case of dvandvas, we can ask about the status of ambiguous cases like (31a). Are they single words derived by inflecting a prefixed root? Or two separate adjacent words? Blocking

²²Pāṇini’s grammar actually makes this preference explicit (by putting compounding under the major heading *vā* ‘preferably’). Also, he lists certain compounds as being *nitya* ‘obligatory’. See Kiparsky 1979 for Pāṇini’s treatment of variation and for evidence from Sanskrit usage that corroborates it. Note that there are cases where only the compound is grammatical, and cases where the compound is ungrammatical. The generalization concerns cases where both options are grammatical.

²³Poetic artifice involving variation and parallelism may also play a role. It may be behind the pattern of variation in the hymn 7.66 from this which example is taken: the two gods are introduced as a pair with the syntactic conjunction *mitráyor váruṇayoḥ* in verse 1, then addressed individually in the singular (verses 3, 4, 7, 9, 11, 12, 17, 18) and finally together again in a dual co-compound (v. 19).

²⁴A form like (31c) can only be derived by suffixation of *-yā* to the compounded root *sam+rabh*, not by prefixation of *sam* to the suffixed root **rabh-ya*. The most straightforward reason is that the bare root requires the allomorph *-tvā* (e.g. *labh-tvā* → *lab-dhvā* ‘taking’), so the correct affix can only be selected after the prefix is already in place. See Kiparsky 2007 for the arguments in detail.

gives priority to a morphological one-word expression over the corresponding syntactic two-word expression, unless the latter is required to express some additional intended meaning. It is likely that tmesis, as in (31b), is motivated by focus or emphasis, and possibly by other rhetorical effects. In those cases where the two expressions are string-identical, no such additional meaning, even a rhetorical one, is expressed. And in such cases, the phonology regularly treats preverb+verb combinations as one word rather than two; in fact, here it shows that they are single words even in the *lexical* phonology. They have a single accent (on the preverb if the verb is accented, as it usually is in subordinate clauses, on the verb otherwise), and the *ruki*-rule and *n*-retroflexion apply:

- (32) a. *ví śyanti* (1.85.5) ‘they wet’, *pári śicyate* (4.49.2) ‘is poured’, *ní śīdata* (1.22.8) ‘sit down’
 b. *pári ṅīyate* (3.2.7) ‘is led around’, *prá ṅonumaḥ* (1.78.1) ‘we shout’

So it seems that string-adjacent preverb+verb combinations also show near-categorical blocking of syntax by morphology, confirming the my explanation for the distribution of dvandvas.²⁵

The blocking principle is diachronically manifested in the reanalysis of phrases into words (univerbation), and indeed provides the theoretical explanation for the unidirectionality of this process. Over time, the preference pushes ambiguous cases from their original phrasal analysis to their one-word analysis. In other words, it drives expressions along the grammaticalization trajectory in which “the parts of a constructional schema come to have stronger internal dependencies” (Haspelmath 2004), turning clitics into suffixes, obliterating morpheme boundaries, etc. (for a more careful formulation see Kiparsky in press, b). In the case of ambiguous dvandvas like *mitráváruṇa-*, the single-word preference correctly predicts that the lexical (single-word) analysis will supplant the phrasal analysis. The evolution of dvandvas, then, can take its place among other well-documented grammaticalization processes.

In summary, the grammar conjoins nouns asyndetically in two ways: in the syntax by co-ordination, and in the morphology by compounding. There are unambiguous syntactic co-ordinations and unambiguous morphological compounds, but the bulk of attested dvandvas are superficially ambiguous between the two analyses. Three things indicate that the ambiguous cases are treated only as compounds: the general cross-linguistic preference for the simplest structure, the observed direction of language change in Sanskrit, and finally phonological data internal to the language. I attributed the preference for the compound analysis to an independently motivated blocking principle, whose operation is closely paralleled in Sanskrit preverb+verb combinations.

2.8 Semantics: the associative dual

We have concluded that the ending of the first member of Vedic dvandvas is not a case ending, contrary to appearances, but an associative derivational morpheme. Let us now try to pin down its meaning and function. This will complete the synchronic analysis, and prepare the ground for our exploration of its history in the next section.

The so-called ELLIPTIC DUALS of Vedic mark their stems as one of a pair of associated items, e.g. *dyāvā* ‘Heaven and Earth’ (literally ‘Heaven-Dual’). They are termed “elliptic” because they were once thought to be derived from dvandvas by dropping their second member. But it has long

²⁵Blocking is applicable also to combinations of so-called separable prefixes and verbs in German. It says that in a clause such as *wenn der Zug ankommt* ‘when the train arrives’, *an + kommt* ‘arrives’ is a single word (as the orthography writes it); the two-word parse that the syntax provides for it is blocked. This agrees with the conventional one-word spelling, but I am not aware of any phonological evidence pro or con.

been recognized that they are actually older than dvandva compounds and more widely distributed in Indo-European languages, and constitute the historical basis of the Vedic dual dvandvas (Wackernagel 1905). Although the older view got the historical relationship backwards, it was based on the real insight that the two formations are semantically closely related.

As noted in section 2.2, the suffix of the first member of a dvandva never has the variant *-au* for *-ā*, unlike the regular N.A. Dual ending. The same is true of the first member of a syntactically split compound. Significantly, the elliptic dual (as opposed to the dual that marks number, typically on body parts and other natural pairs) tends to have the form *-ā* as well.²⁶ Comparative grammar shows that the original form of the ending is *-ā*; its skewed distribution is a hint that *-au* arose in the function of an ordinary case/number ending in the inflectional paradigm. It never penetrated the dvandvas and made only faltering inroads into the elliptic dual.

This can be taken as a clue that the *-ā* of elliptic duals, like that of dvandvas, functioned until shortly before the Rigveda was composed as a stem-forming derivational morpheme, in contradistinction to the inflectional ending *-ā/-au*. The *-ā* of elliptic duals and first members of dvandvas is an ASSOCIATIVE DUAL (Cysouw 2003, Moravcsik 2003, Daniel 2005). It yields a type of inherently dual noun stem — the associative stem — which denotes, not a set of two Ns, but N and something else which forms a natural or conventional pair with N. For example: the regular duals of *father* and *mother* mean ‘two fathers’ and ‘two mothers’ (fn. 26), but the associative duals of *father* and *mother* both mean just ‘parents’. And the regular duals of *night* and *dawn* means ‘two nights’ and ‘two dawns’, but the associative dual of *night* and *dawn* both mean just ‘Night and Dawn’ (personified as deities).

As described above, the associative stem is morphologically marked by a lengthening of the stem-final vowel; after a consonant stem it is *-ā*. The associative stem marks its stem as being a PHONOLOGICAL WORD, with all attendant consequences.

The associative stem denotes the base as one of a pair. The other member of the pair need not be explicitly specified. If it is left implicit, it can be identified by contextual inference or convention. This is the elliptic dual.

The other referent can be explicitly specified in one of several ways, either syntactically or morphologically. It can be expressed by a syntactically co-ordinated nominal. As is usual in Sanskrit, the co-ordination can either be marked by a conjunction (usually *ca*) or remain unmarked. In either case, the coordinated nominal can either be dual also, or it can be singular. Examples of co-ordinated duals are given in (33).

- (33) a. Explicitly co-ordinated duals:
nāktā ca cakrūr uṣāsā (1.73.7) ‘they have created Night and Dawn’
- b. Asyndetically co-ordinated duals:
mitrāyor vāruṇayoḥ (7.66.1) ‘for Mitra and Varuṇa’

Examples of the second conjunct in the Singular are given in (34):

- (34) a. Dual with explicitly co-ordinated Singular:
mitrā . . . vāruṇo yās ca sukrātuḥ (8.25.2) ‘Mitra and wise Varuṇa’

²⁶ There are however at least three instances of associative *-au*: *pitārau* ‘parents’ (1.121.5 and 10.131.5), *uṣāsau* (1.188.6). But in 10.85.14 *pitārau* means ‘two fathers’, in 10.115.1 *mātārau* means ‘two mothers’.

b. Dual with asyndetically co-ordinated Singular:

vánaspátīn uṣāsā náktam óśadhīh (8.27.2) ‘the trees, Dawn, Night, the plants’

All four variants are strictly speaking redundant, for the associative dual by itself expresses the intended meaning of a pair of whose members are associated conventionally and uniquely. The words *náktā* ‘Night-Dual’ and *uṣāsā* ‘Dawn-Dual’, *mitráyoḥ* and *mitrá* ‘Mitra-Dual’, (33, (34b)) by themselves already refer to the pairs ‘Dawn and Night’ and ‘Mitra and Varuṇa’, respectively. Specifying the other conjunct does not add anything to the meaning of the dual nouns but just makes it more explicit.

The “missing” conjunct is sometimes modified by an adjective, as detectable by a gender mismatch. In (35), the masculine duals *pitárā* ‘fathers’ (‘parents’), and *dyāvā* ‘heavens’ (‘Heaven-and-Earth’) are modified by *feminine* dual adjectives, evidently agreeing with the implicit dual second members *mātárā* ‘mothers’ and *pṛthivī* (Oliphant 1912: 35).

- (35) a. *pūrvajé* *pitárā*
before-born-Fem.Nom.Du. father-Masc.Nom.Du.
‘the parents born before us’ (7.53.2)
- b. *ubhé* *dyāvā*
both-Fem.Nom.Du. Heaven-Masc.Nom.Du.
‘both heaven and earth’ (9.70.2)

It has been observed that 1/2P Dual and Plural pronouns have an associative meaning which is similar to that of the dual names just considered. E.g. *we* = ‘I and the other people in some (either implicit, or explicitly specified) group’ (Cysouw 2003, Daniel 2005). So, since the 1/2P Dual is in a sense an “elliptic dual” (as noted already by Wackernagel), the “inclusory” construction in (36) is just a special case of the construction (34a).

- (36) a. *á yád ruháva váruṇas ca návam* (7.88.3)
‘When we and Varuṇa (= Varuṇa and I) climb(Dual) on the boat’
- b. *úd yád bradhnásya viṣṭápaṃ ḡrhám índras ca gánvahi* (8.69.7)
‘When we and Indra (= Indra and I) climb(Dual) home to the height of the sun’

Importantly, the plural does *not* have an associative interpretation with names and kinship terms,²⁷ only with pronouns (‘we’ and ‘you’ mean ‘I/you and others’). This supports our analysis, which ties the associative dual to the semantics of the associative morpheme.

Finally, the second conjunct can be specified morphologically, in a compound. The result is just a dvandva of the type under discussion here, e.g. *náktoṣāsā* (9.5.6) ‘Night and Dawn’. As described above, such a dvandva stem can then get either secondary denominal affixes, or case/number affixes. Because these affixes go on the whole compound, the first member remains invariant, and the oblique case appears only once, on the second member of the compound: *indrāpūṣṇóḥ* (1.162.2), *indrāváruṇayoḥ* (1.17.1) etc.

Gratifyingly, Vedic dual-dvandvas fit all established typological generalizations about associatives. Associative duals/plurals always attach to a semantically restricted subclass of nouns or

²⁷Except for one (or possibly two) attested instances: *abhí samrájo váruṇo ḡṇanty abhí mitrásō aryamā sajósāḥ* (7.38.4) ‘the united mighty rulers join in the song of praise, Mitra with Varuṇa and Aryaman’, literally ‘the Mitras (Plural), Varuṇa, and Aryaman’, and one other less clear case (Edgerton 1909).

pronouns. They are without exception DEFINITE, and tend to refer to humans (or divinities); most often they are proper names, kin terms, or titles (Moravcsik 2003). This is certainly true of Vedic dvandvas.

A well-known example is the Dyirbal associative dual *-gara* ‘one of a pair’ (Dixon 1972: 230-1).

- (37) a. *burbula-gara baniṇu*
 burbula-AssocDu come
 ‘Burbula and another person are coming’
- b. *burbula-gara badibadi-gara baniṇu*
 burbula-AssocDu badibadi-AssocDu baniṇu
 ‘Burbula, being one of a pair, and Badibadi, being the other of the pair, are coming’

Moreover, associatives are often *derivational* suffixes, as proposed here for Vedic. For example, in Hungarian the associative plural evidently does not belong to the inflectional paradigm. The relationship seen in Vedic between the associative interpretation and the ordinary number value also has parallels; for example, Japanese *-tati* is apparently ambiguous between an associative and ordinary plural.

- (38) a. Hungarian *-ék*: *tanító-ék* ‘the teacher and his group’, *János-ék* ‘János and associates’
 (contrast *János-ok* ‘the Jánoses = people called J.’)
- b. Japanese *-tati*: *sensei-tati* (1) ‘teacher and his group’, (2) ‘teachers’

3 History of Vedic dvandvas

3.1 Their rise

Studies of the Indo-European dual have suggested that dual number inflection in nouns arose by grammaticalization of a Proto-Indo-European derivational category with neuter gender and a “collective” meaning,²⁸ marked by the suffix *-h₂* (Fritz 2000, Malzahn 2000). This, they argue, is why the dual suppresses the formal distinction between nominative and accusative, just as the neuter gender does. Moreover, in a class of morphologically conservative nouns denoting body parts, the dual’s oblique cases appear to be built on the nominative/accusative ending, or on a form that contains that ending. For example, N.A.Du. *akṣī* ‘eyes’ is transparently identical with the dual stem of Instr/Dat./Abl.Du. *akṣībhyām*.

The collective meaning posited for the original dual category is close to the associative dual that underlies elliptical duals and Vedic dvandvas. So it is not unlikely that the associative morpheme goes back to the proto-language, mainly in designations of natural pairs (body parts and the like).

The Indo-European collective dual suffix is reconstructed as *-h₂*. It is formally identical with the instrumental singular suffix *-h₂*. Hans Hock, Stephanie Jamison, and Calvert Watkins (*voce*) have suggested to me that these suffixes are cognate. This is an attractive idea because the associative construction is just a short step away from a comitative construction, probably the original function of the instrumental case:

- (39) a. *N-Comitative X* ‘X with N’

²⁸Or an “inalienable” meaning (Meier-Brügger 2002: 192-3).

b. *N-Associative X ‘N and X’*

And of course comitatives have an associative function in some languages, such as Finnish:²⁹

- (40) me mentiin Mati-n kanssa
we went Matti-Gen with
‘Matti and I went’

So the historical connection between instrumental case and associative dual, from which the general dual number would in turn derive, is quite plausible.³⁰

Another precondition for the rise of Vedic dvandvas is asyndetic conjunction. This syntactic construction is found in several other branches of Indo-European (Wackernagel 1905: 150), though it is hard say whether it goes back to the proto-language or not.

- (41) a. OCS *Borisa Glěba* (more often ... *i Glěba*, Žolobov 2002, Liukkonen 1973)
b. Av. *ahuraēⁱbya miθraēⁱbya* ‘for Ahura and Mithra’, *pasvā vīrayā* ‘cattle and men’
c. Hitt. *naḥšaradduš weritemuš* ‘Fear and Fright’ (Puhvel 1977)

In spite of the fact that the combination of an associative dual and asyndetic conjunction was present in a number of Indo-European languages, only the Indic branch seems to have grammaticalized them into a productive morphological operation of dvandva compounding (although other branches have developed dvandva compounds of the unremarkable Classical Sanskrit type from other sources). Perhaps this has to do with the productivity of its compounding, vigorous even in the earliest Vedic and reaching unprecedented heights in Classical Sanskrit.

3.2 Their loss

Returning to the puzzle we began with, let us suppose that univerbation reduces structure, as we have assumed. It condenses syntactically generated phrases into morphologically generated compound stems. How then can the path from the perfectly regular pre-Vedic asyndetic conjunction structure to the equally regular classical dvandva compounds go via the morphologically complex Vedic dvandvas, with their stem-forming suffix, and their morphology/phonology mismatch in the lexical phonology? If reduction of structure is a kind of simplification or optimization, why does it increase the overall complexity of the system, if only at a transitional stage?

A mechanism which could be responsible for such increases of grammatical complexity is successive misanalysis and partial retrenchment in real-time acquisition. The idea is that learners can internalize their own and each other’s wrong outputs, by using them productively and imitating one another; if they then incorporate them partially into their evolving grammar, hybrid structures and increased complexity can result. According to this scenario, misanalysis of conjoined phrases as regular morphological compounds at early stages of acquisition would have introduced pronunciations into the ambient language which, if retained after the full evidence prompts their “correct” analysis as two phonological words, would have forced learners to assign them the hybrid structure of Vedic described in section 2.

²⁹See also the description of the Bunuba associative in Rumsey 2000:62-63 and Singer 2001: 56.

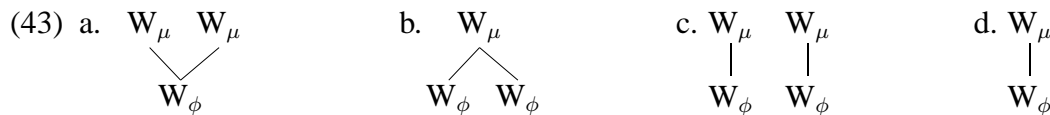
³⁰Hans Hock further draws attention to the associative instrumental construction RV. *yudhā yudham* ‘fight by fight’, (1.53.7), *purā puram* ‘fort by fort’, which Hoffmann 1960 connects with the *āmreḍita* (adverbial) forms *menāmenam*, *dhurādhuram* found in the Jaiminīya-Brāhmaṇa, unfortunately of uncertain meaning.

This account is incomplete because it provides no explanation for the orderly separation of phonological and morphological properties that we have found. Obviously not any misanalysis is a potentially successful innovation. I propose that the missing part of the story is supplied by Optimality Theory, and its Stratal version in particular. It can model the observed bundling of properties, and the partial regularizations which give rise to them, on the basis of the idea that constraints are ranked and violable, and that constraint violations occur if and only if more highly ranked constraints compel them.

Let us return to the constraint-based analysis of dvandvas, this time presenting the constraint system in a more complete and principled way and bringing in the historical perspective. There are two pairs of core morphological constraints. The first pair, given in (42), impose a match between phonological and morphological words.

- (42) a. $W_\phi \subseteq W_\mu$ (A phonological word must contain a morphological word.)
 b. $W_\mu \subseteq W_\phi$ (A morphological word must contain a phonological word.)

These two constraints are respectively violated by mismatches like (43a) and (43b), and both are satisfied by structures where phonology and morphology are congruent, as in (43c) and (43d).



The second pair of constraints minimizes structure by requiring a one-word analysis rather than a two-word analysis, one on the phonological tier, the other on the morphological tier. It is these constraints that diachronically drive univerbation, partly in conjunction with the constraints in (42).

- (44) a. $*W_\phi W_\phi$ (Minimize the number of phonological words.)
 b. $*W_\mu W_\mu$ (Minimize the number of morphological words.)

Constraint (44a) is violated by (43a) and (43b), constraint (44b) is violated by (43a) and (43c), and both are satisfied by the minimal structure (43d). For (44) it is especially important to keep in mind the OT principle that constraints take effect only when higher-ranked constraints allow. Obviously not any pair of adjacent words will be subject to analysis as one word, because of higher-ranked constraints that supersede (44). These include at least the constraints which govern syntactic structure (X-bar structure, government etc.) and morphological structure (contiguity of parts of a word, etc.). To simplify matters, let us assume here that such potential overgeneration of (44) is taken care of by the appropriate set of dominant constraints, and turn to the conjoined structures at issue.

The constraints in (42) and (44) are all we need to get the Classical Sanskrit one-word analysis of compounds (actually (42a) and (44b) don't do anything useful for this body of data, but I include them in the tableaux anyway for the sake of completeness). In the derivation of the pre-Vedic two-word structure and of the Vedic hybrid structure, some morphological/semantic constraint enforces the associative suffix. For synchronically arbitrary (but historically explicable) reasons this formative turns its stem into a phonological word. Let us represent this idiosyncratic property by the dominant language-specific constraint (45).

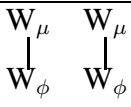
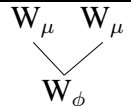
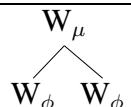
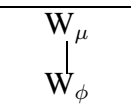
(45) $-\bar{a}]_{W_\phi}$ ($-\bar{a}$ is aligned with a phonological word)

This constraint defeats the one-word analysis that (42) and (44) would otherwise impose. Different rankings of these constraints generate the three stages in the evolution of dvandvas we have considered above: the initial Indo-Iranian stage of asyndetic co-ordination, the final Classical Sanskrit stage of one-word compounding, and the hybrid structure of the intermediate Vedic stage.

Change is often best captured by constraint promotion. For example, regular sound change is modeled most simply as promotion of a phonological markedness constraint to undominated status in the postlexical phonology. The ranking may later spread to the lexical phonology. Descriptively, the effect is that the constraint becomes unviolated, and eventually becomes phonologized. If we assume a similar constraint promotion analysis for morphological change, then we can model the evolution of dvandvas with the constraints presented here as follows.

The starting point is the Indo-Iranian (and probably late Indo-European) system in (46). The associative morpheme enforces makes its stem into a word, which prevents compounding.

(46) Indo-Iranian ranking: $-\bar{a}]_{W_\phi}, W_\phi \subseteq W_\mu, W_\mu \subseteq W_\phi \gg *W_\mu W_\mu, *W_\phi W_\phi$

	$-\bar{a}]_{W_\phi}$	$W_\phi \subseteq W_\mu$	$W_\mu \subseteq W_\phi$	$*W_\mu W_\mu$	$*W_\phi W_\phi$
1. 	✓	✓	✓	*	*
2. 	*	*	✓	*	✓
3. 	✓	✓	*	✓	*
4. 	*	✓	✓	✓	✓

In the transitional system of Vedic, the lexical phonology differs from (46) in that the constraint (44b) $*W_\mu W_\mu$ is promoted. (The arrows are just there to visualize the reranking; they have no formal status in the analysis.)

(47) Vedic (lexical phonology): $*W_\mu W_\mu, -\bar{a}]_{W_\phi}, W_\phi \subseteq W_\mu \gg W_\mu \subseteq W_\phi, *W_\phi W_\phi$

		$*W_\mu W_\mu$	$-\bar{a}]_{W_\phi}$	$W_\phi \subseteq W_\mu$	$W_\mu \subseteq W_\phi$	$*W_\phi W_\phi$
1.	$\begin{array}{c} W_\mu \quad W_\mu \\ \downarrow \quad \downarrow \\ W_\phi \quad W_\phi \end{array}$	*	✓	✓	✓	*
2.	$\begin{array}{c} W_\mu \quad W_\mu \\ \diagdown \quad \diagup \\ W_\phi \end{array}$	*	*	*	✓	✓
3. \leftarrow	$\begin{array}{c} W_\mu \\ \diagdown \quad \diagup \\ W_\phi \quad W_\phi \end{array}$	✓	✓	✓	*	*
4.	$\begin{array}{c} W_\mu \\ \downarrow \\ W_\phi \end{array}$	✓	*	✓	✓	✓

The postlexical phonology of Vedic is already more advanced, with (42b) $W_\mu \subseteq W_\phi$ also promoted.

(48) Vedic (postlexical phonology), Classical: $W_\mu \subseteq W_\phi, *W_\mu W_\mu \gg -\bar{a}]_{W_\phi}, W_\phi \subseteq W_\mu, *W_\phi W_\phi$

		$W_\mu \subseteq W_\phi$	$*W_\mu W_\mu$	$-\bar{a}]_{W_\phi}$	$W_\phi \subseteq W_\mu$	$*W_\phi W_\phi$
1.	$\begin{array}{c} W_\mu \quad W_\mu \\ \downarrow \quad \downarrow \\ W_\phi \quad W_\phi \end{array}$	✓	*	✓	✓	*
2.	$\begin{array}{c} W_\mu \quad W_\mu \\ \diagdown \quad \diagup \\ W_\phi \end{array}$	✓	*	*	*	✓
3.	$\begin{array}{c} W_\mu \\ \diagdown \quad \diagup \\ W_\phi \quad W_\phi \end{array}$	*	✓	✓	✓	*
4. \leftarrow	$\begin{array}{c} W_\mu \\ \downarrow \\ W_\phi \end{array}$	✓	✓	*	✓	✓

In the Classical Sanskrit system, this ranking is further extended to the lexical phonology. Once this innovative ranking is established, the associative suffix no longer has any visible effects, because the higher-ranked constraints defeat them. The suffix is still assigned to the first member of dvandvas by the appropriate morphological constraints (not spelled out here), but it can no longer induce phonological wordhood on its stem. At this stage, prevalent in late Vedic, but with early examples already in the Rigveda, dvandvas have a single accent on the final syllable, in spite of the associative, which is at this point always $-\bar{a}$:

- (49) N.A.Du. *vātāparjanya* ‘Wind and Rain’, N.A.Du. *sūryācandramāsā* ‘Sun and Moon’, Gen./Abl.Du. *indrāpūṣṇóḥ* ‘Indra and Pūṣan’, Instr/Dat./Abl.Du. *somāpūṣābhyām* ‘Soma and Pūṣan’.

This reflects the ranking (48) throughout, by which dvandvas are single compound words both in the lexical phonology and in the postlexical phonology, hence with a single accent. Since they are single words at all levels of representation, the prediction is that these dvandvas are *not* split across a caesura. This is in fact correct (Insler 1998: 288).

Like other oxytones, the C-stems are accentually mobile, with suffixal accent in the oblique cases (*cas faibles*), e.g. Gen.Du. *indrāpūṣṇóḥ* 1.162.2. The fact that the loss of the accent results in oxytone stems is predicted by the account of Vedic accent given in Kiparsky (1984).

This late Vedic system finally passes into Classical Sanskrit with one additional change, the loss of the associative morpheme. Once that happens, the dvandvas are just stem+stem compounds with no remaining phonological or morphological irregularities whatsoever. The nature and cause of this additional morphological change requires further investigation, but it is very likely connected to a semantic change in the category of dual. A clue which points to that conclusion is the fact that the elliptic dual of nouns is lost at the same time as the Vedic dvandvas. From this point onwards the dual is just a number, independent of definiteness and humanness, parallel to the plural, with no associative interpretation (outside of first and second person pronouns, for which the associative interpretation is available in all languages). The fact that elliptic duals and Vedic dvandvas disappear hand in hand confirms the relationship between them that our analysis in section 2.8 posited.

Let us suppose that changes take place in minimal increments, and that they are initiated in the postlexical component (as has been argued in other work). On purely theoretical grounds, this implies the following micro-stages of univerbation.

- (50) a. Postlexical promotion of (44b) $*W_{\mu}W_{\mu}$,
 b. lexical promotion of (44b) $*W_{\mu}W_{\mu}$,
 c. postlexical promotion of (42b) $W_{\mu} \subseteq W_{\phi}$ (Vedic),
 d. lexical promotion of (42b) $W_{\mu} \subseteq W_{\phi}$ (Classical Sanskrit).

Change (50a) would have been essentially covert, with no visible effects. The various phonological and morphological innovations attendant upon univerbation would have come in with changes (50b) and (50c). These could have taken place in either order; attested Vedic is reached when both have taken place. The precise path is unfortunately not accessible in the historical record, and perhaps cannot be reached through comparative reconstruction either.

With the help of Prosodic Phonology, and a particular approach to blocking which crucially allows blocking interactions between words and phrases, our OT analysis has provided a synchronic rationale for the strange grammar of Vedic dvandva compounds, which in turn enabled us to trace their evolution from Indo-Iranian to Classical Sanskrit. The diachronic analysis supports the idea that grammaticalization/lexicalization, like ordinary exemplar-driven analogical change, reduces complexity by eliminating gratuitous structure and arbitrariness. In the subsystem studied here,

³⁰RV. *indravāyū* (Dual) ‘Indra and Vāyu’ would be the earliest instance of the type, but it is disputed. Arnold (1905: 123) argues on metrical grounds that “*indrāvāyū* must in all instances be restored”, because “it never stands at the end of a Triṣṭubh verse, or in any other position in which *a* is favored.” On the other hand, Insler 1998 and van Nooten & Holland 1994 reject Arnold’s emendation and favor the usual reading *indravāyū*.

the change begins by eliminating the dvandvas' phrasal structure, synchronically unmotivated in view of their name-like semantics. The result is the Vedic stage that we examined at length, where the main sources of arbitrariness are the idiosyncratic morphological constraint (45), and the disparities between the lexical and postlexical systems, the grammatical locus of both being the associative dual suffix (originally the N.A.Dual ending), which imposes phonological wordhood on its stem. The subsequent regularization of dvandvas involves the elimination of this idiosyncrasy, first partially, then completely, by reranking in two steps. The relative complexity of the intermediate stages is a necessary consequence of the gradualness of the change. On this understanding, the evolution of dvandvas is compatible with, and indeed supports, the view that grammaticalization is optimization.

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