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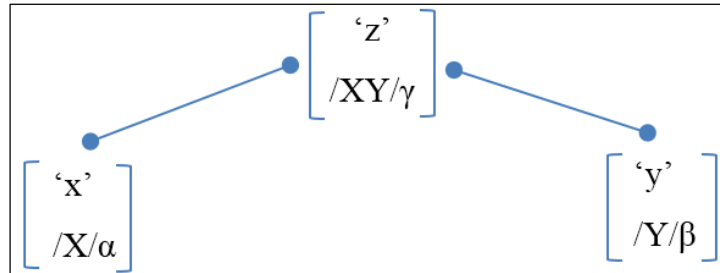
The tripartite word-formation scheme applied to Sanskrit compounding

Anselmo Hernández-Quiroz and Ramón F Zacarías-Ponce De León

Introduction
1. The 'Focus' of a morphological correspondence

A compound word is not the 'sum of bases', 'sum of lexemes', or any other structural elements that can be theoretically invoked. Instead, a compound word is the whole word that integrates the semantic functions of two other whole words with which it is related. Therefore, we call it an 'integrated word'. And this integrated word functions as the middle point of a tripartite morphological correspondence that is connected with a cognitive 'reference point' (Langacker 1999). Here we have the general schema of integrated words:

Fig 1: General scheme of integrated words.

Where:

⬚	Represents sets of words.
•—•	Represents a punctual interrelationship.
'X', 'y' & 'z'	Represents semantic functions.
/X/, /Y/ & /XY/	Represents phonological structures.
α, β & γ	Represents syntactic categories.
γ	Necessarily is the same as α or β.
α & β	Can be the same category.

In Figure 1, we can see that the integrated word standing in the middle of the morphological correspondence is composite only at the phonological level (/XY/). That is, it is just at the phonological level that we recognized two structures related to two different whole words. But, at the semantic level ('z'), we have an integration of semantic functions. This integration must be understood as non-derivational in the sense of free of temporal order in regards morphological operations (Orgun 2006: 12), which in this case are punctual interrelationships that can be of two basic types: coordinated (*singer-composer*) and subordinated (*piano-bar*). It must be noted that by morphological correspondence we mean the whole figure of the tripartite scheme represented by the three brackets and the two point-ended lines showing punctual correspondences. So, doing a periphrasis of William's definition in regards the 'head' (1981), we can say the whole word that percolates its grammatical features to the morphological correspondence is the 'focus' of this morphological structure.

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1.1 The organization of metonymic patterns

Metonymy is basically a contiguity relationship. More common metonymies are for example:

1. The part for the whole (The *head* of the Company).
2. The container for the content (She drank two *bottles*).
3. The product for the place of origin (*Champagne* for sale); etc.

Many models study metonymic relationships (Barcelona 2012: 126). In particular, Peirsman and Geeraerts (2006: 270)
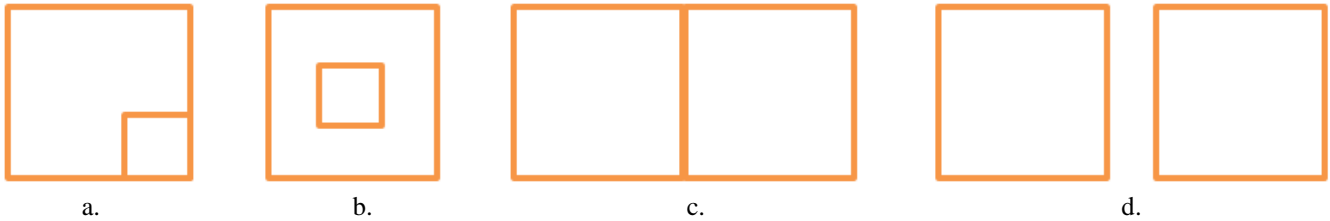
say the prototypical contiguity is the spatial relationship 'part&whole'; from this, it develops all the subsequent types through three categories: domain, degree of contact and delimitation [1]. Here, we will analyse the external predication of Sanskrit *bahuvrīhi* compounds as a metonymic relation based on the adaptation of Zacarías (2017) who simplifies the proposal of both of these last authors as shown in Table 1:

Table 1: Types of metonymy according to Domain and Degree of Contact categories.

Degree of contact →

Domain	Part/Whole	Container	Contact	Proximity
Spatial	Part & whole Whole & part Material & object	Container & content Content & container	Location & located	Vestment & person Entity & adjacent entity
Temporal	Part & whole	Time & entity	Antecedent & subsequent	
Process	Subevent & complex event	State & experiencer Action & participant Participant & action	Cause & effect Effect & cause	Participant & participant Productor & product Possessor & possessed
Grouping	central factor & entity factor & institution characteristic & entity	Individual & group Hyperonim & hyponym		

According to Peirsman and Geeraerts' original proposal, the vertical axis (Domain) refers to the scope in which the metonymy is established. This extends from the spatial to the temporal domain; it continuous towards the domain of processes, actions and events; and finally it extends to the domain of grouping or collection of entities. The horizontal axis (Contact Degree) refers progressively to the closeness between the entities. In particular, the horizontal axis subcategories can be illustrated as follows:

Fig 2: Symbolization of Contact Degree subcategories.

In Figure 2 are represented from the closest to the less close four kind of relationships that constitutes Contact Degree subcategories: Figure 2.a represents a small square that conforms a part of a big square (part / whole); Figure 2.b represents a small square that is located inside a big square (container); Figure 2.c represents two squares that are just adjacent (contact); finally, Figure 2.d represents two squares that are just near (proximity). In first place, these relationships can be applied to a cognitive domain where actions, things and relations metaphorized as objects are located somehow in the space; but then, these can be applied subsequently to a temporal, processual and grouping domain. Finally, the metonymic patterns depicted in Table 1 are the most common, but more patterns can be added if they happen to be found. Next, in Section 2 we present a Whole-word-based analysis of two types of metonymic Sanskrit compounds, which are termed by us 'subordinated integrated words'. The general schema of integrated words presented in Figure 1 and the metonymical organization of the Table 1 will be modified according to the required specifications and we will notice it in the corresponding places.

2. A cognitive analysis of the external predication: two examples

According to Kulkarni *et al*. (2012: 1494), who worked with a manually tagged corpus of Sanskrit compounds classified by traditional parameters, the determinative compounds cover 58.70% of the compounds in the corpus, while possessives cover only 11.04%. Let us remind that for the purpose of this paper these last ones are termed here metonymic compounds, and they are characterized as 'integrated words'. Many of these metonymic compounds stand as an integrated word at the middle of a tripartite interrelationship that has their head to the right side. Next, we present two examples of schemes extracted from fifty-one subordinated integrated words according to our whole word based model adapted methodology.

2.1 Adjective-Noun-Noun right edged Word-based scheme

In our cognitive analysis, we exclude the use of morphological units below the level of the word; rather, we use only whole words as units and analyse their functional interrelationships. What traditionally is assigned to 'compounding' in the Morpheme and Lexeme based morphology can be easily managed in our model as a kind of interrelationship between three whole words (see Figure 1 previously explained in the last Section).

In applying our whole word based scheme analysis, we found a type of tripartite interrelationship pattern that consists of a whole word that integrates the semantic functions of a

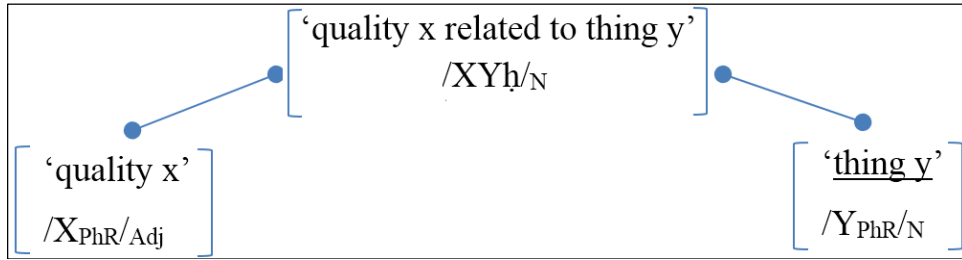quality-word and a thing-word. So, we have a Word-formation functional pattern like this: 'quality'-'quality& thing'-'thing'. For example:

1. 'multiple' *naikaḥ*_{Adj.m} ●━━● 'multiple form' *naikarūpaḥ*_{N.m} ●━━● 'form' *rūpaḥ*_{N.m}
2. 'long' *dīrghā*_{Adj.f} ●━━● 'long shank' *dīrghajaṅghaḥ*_{N.m} ●━━● 'shank' *jaṅghā*_{N.f}
3. 'much' *bahum*_{Adj.n} ●━━● 'much thirst' *bahutṛṣṇaḥ*_{N.m} ●━━● 'thirst' *tṛṣṇam*_{N.n}

As can be noted in (2), this group contains a series of substantives in the three genders arranged to the right side with corresponding adjectives in agreement to the left, both in singular. There are also integrated words that stand in the middle of the tripartite interrelationship, all of them given in the masculine as a referent rule, besides being in singular too. Each integrated word has a bold face word ('multiple form') that represents its own internal predication, which is a pragmatic choice. Finally, the subscripted thing-word to the right side ('form') represents the head of the whole tripartite interrelationship scheme.

These kind of tripartite interrelationships are based on morphological correspondences that can be abstract in the next word scheme of integrated words: [2].

$_{PhR}$ = Phonological Residuum: $/X\underline{h}/$ = m. f.; $/X\bar{a}/$ = f. m.; $/Xm/$ or $/X/$ = n.

Fig 3: Scheme of subordinated integrated words of the type 'Adj ●━● N ●━●N'.

Figure 3 represents the fundamental semantic, phonological and syntactical properties of this tripartite morphological correspondence. At the semantic level, we have in the middle an integration of semantic functions commanded by an internal predication in terms of a quality related with certain thing. At the phonological level, we have a sum of two phonological structures that have a systematic and automatic loss of Phonological Residuum indicated by means of an index that covers all the general cases of final phonological elements in the three genders. Moreover, all the words are assumed to occur categorically in the Nominative Singular form of their own paradigm.

Further, the integrated words of this kind of tripartite morphological correspondence represented above as 'quality x related to thing **y**' maintain an external predication to another referents; for instance 'impenetrable armour' *nivātakavacaḥ*_N, which has as a usual referent a 'warrior':
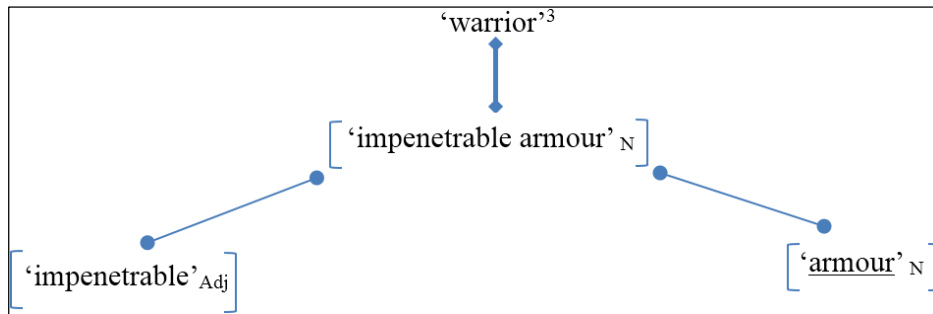

Fig 4: Scheme of external predication of integrated words of the type 'Adj ●━● N ●━●'.

Figure 4 represents the fundamental semantic properties of this second predication established by means of the referent point cognitive construction as a metonymy in the spatial domain due to contact where the 'vestment' ('impenetrable armour') is taken for the 'person' ('warrior'). Other instances organized in metonymic terms are shown in Table 2: [3]

Table 2: Metonymic organization of integrated words of the type represented in Figure 4.

Metonymic Integrated Word	Domain	Degree of contact	Metonymic relationship	Referent
'potable water' *nipīta-toyaḥ*_N	spatial	part/whole	material&object	'river'
'effective punishment' *amogha-daṇḍaḥ*_N	grouping	part/whole	characteristic&entity	'god Śiva', 'chastiser',
'freed evil' *nirmukta-pāpaḥ*_N	process	contact	cause&effect	'knower', 'wise', 'emancipated', etc.
'impenetrable armour' *nivāta-kavacaḥ*_N	spatial	contact	vestment&person	'warrior'
'long shank' *dīrgha-jaṅghaḥ*_N	spatial	part/whole	Part & whole	'gorgeous woman', beautiful woman', 'long legged woman'
'lot rice' *bahu-vrīhiḥ*_N	process	proximity	possessed&possessor	'rich man, field, sacrifice, etc.'
'much thirst' *bahu-tṛṣṇaḥ*_N	process	container	state&experiencer	'thirsty person', 'desirous person'
'tied gaze' *baddha-dṛṣṭiḥ*_N	process	container	action&participant	'adorer'

Table 2 provides an organization of the ways in which metonymy is constructed and we can see instances of the different crossings between Domain and Degree of Contact categories that define certain metonymic relationships. For instance, the spatial domain comes across with the part/whole degree to provide a metonymy in two different ways: taking the 'material' ('potable water') for the 'object' ('river'); and taking the 'part' ('long shank') for the 'whole' ('gorgeous woman'). The part/whole degree also comes across with the grouping domain, taking the 'characteristic' ('effective punishment') for the 'entity' ('god Śiva').

Besides, there is a good example of gradation in metonymy showed by the process domain coming across with three different degrees: first, it comes across with the container degree in two different ways, taking the 'state' ('much thirst') for the 'experiencer' ('thirsty person'), and taking the 'action' ('tied gaze') for the 'participant' ('adorer'); second, it comes across with the contact degree, taking the 'cause' ('freed evil') for the 'effect' ('wise'); third, it comes across with the proximity degree, taking the 'possessed' ('lot rice') for the 'possessor' ('rich'). In particular, these metonymies can be symbolized following the representation saw in Figure 2 of Contact Degree subcategories:
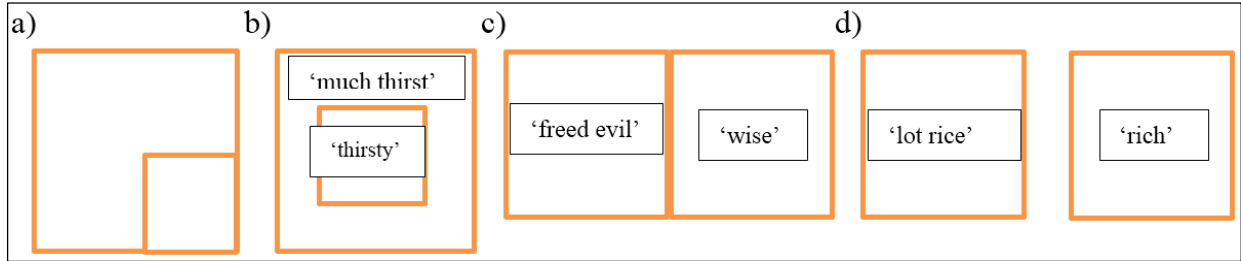

Fig 5: Symbolization of metonymies in three gradations across the process domain.

In Figure 5.b-d are represented some metonymies across the process domain. First, in Figure 5.b we have represented a state of having much thirst as a big square that contains a small square which represents some experiencer of that state. Second, in Figure 5.c we have represented the cause of being freed from evil and the consequent effect of being wise just as two adjacent squares –in Sanskrit culture, ignorance is considered the greatest evil. Third, in Figure 5.d we have represented the fact of possess a lot of rice and the one who

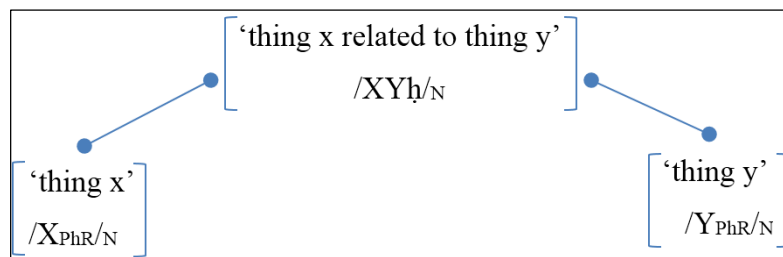owns it becoming a rich person for that possession as two proximate squares.

2.2 Noun-Noun-Noun right edged Word-based schema
Another type of Sanskrit tripartite interrelationship pattern found with its semantic head on the right side consists of a whole word that integrates the semantic functions of two thing-words. So, we have a Word-formation functional pattern like this: 'thing'-'thing & thing'-'thing'. For example:

1. 'moon' $induḥ_{N.m}$ ●——● 'moon face' $induvadanaḥ_{N.m}$ ●——● 'face' $vadanam_{N.n}$
2. 'monkey' $kapiḥ_{N.m}$ ●——● 'monkey flag' $kapiketanaḥ_{N.m}$ ●——● 'flag' $ketanam_{N.n}$
3. 'lotus' $kamalam_{N.n}$ ●——● 'lotus eye' $kamalanayanaḥ_{N.m}$ ●——● 'eye' $nayanam_{N.n}$

In (3) we have a sample of integrated words ('moon face') that stand in the middle of a tripartite interrelationship with two thing-words, one of them being the head ('face') standing

at the right side. From these and similar morphological correspondences one can abstract the next word scheme of integrated words:

$_{PhR}$ = Phonological Residuum: $/Xḥ/$ = m. f.; $/Xā/$ = f. m.; $/Xm/$ or $/X/$ = n.

Fig 6: Scheme of subordinated integrated words of the type 'N ●——● N ●——● N'.

Figure 6 represents again the fundamental semantic, phonological and syntactic properties of the tripartite morphological correspondence, in which this type of metonymic integrated words participates. The same reference rules are maintained as was explained in the case of Figure 3.

Further, the integrated words of this kind of tripartite morphological correspondence represented above as 'thing x related to thing y' maintain an external predication to another referents; for instance 'moon face' $induvadanaḥ_N$, which has as a usual referent a 'beautiful woman':
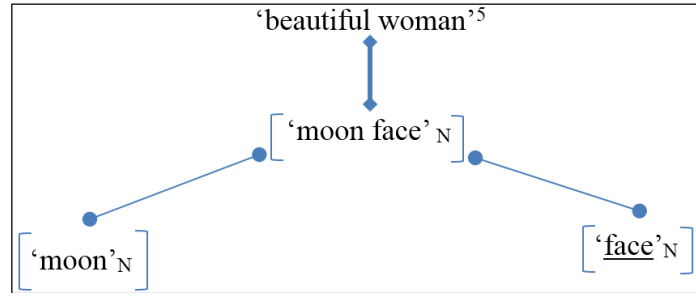
Fig 7: Scheme of external predication of integrated words of the type 'N ●—● N ●—● N̲'.

Figure 7 represents the fundamental semantic properties of this second predication established by means of the referent point cognitive construction as a metonymy in the spatial domain due to part/whole relation where the 'part' ('moon face') is taken for the 'whole' ('beautiful woman'). Other instances organized in metonymic terms are shown in Table 3: [4]

Table 3: Metonymical organization of integrated words of the type represented in Figure 7.

Metonymical Integrated Word	Domain	Degree of contact	Metonymic relationship	Referent
'egg form' *aṇḍa-akāraḥ*$_N$	grouping	part/whole	Characteristic & entity	'god Brahmā'
'guest god' *atithi-devaḥ*$_N$	spatial	proximity	entity&adjacent entity	'foreigner', 'stranger', 'parvenu (unexpected arrival)'
'lotus eye' *kamala-nayanaḥ*$_N$	spatial	part/whole	part&whole	'handsome'
'lotus navel' *abja-nābhaḥ*$_N$	spatial	part/whole	part&whole	'god Viṣṇu'
'moon face' *indu-vadanaḥ*$_N$	spatial	part/whole	part&whole	'beautiful woman'
'monkey flag' *kapi-ketanaḥ*$_N$	grouping	part/whole	characteristic&entity	'hero Arjuna'
'nectar ray' *amṛta-kiraṇaḥ*$_N$	spatial	part/whole	material&object	'moon'
'water womb' *ambu-garbhaḥ*$_N$	spatial	part/whole	part&whole	'cloud'

Table 3 provides again an organization of the ways in which metonymy is constructed and we can see another instances of the different crossings between Domain and Degree of Contact categories that define certain metonymic relationships. In particular, here we have registered two dominant subtypes of metonymy concerning the part/whole degree crossing with the spatial and grouping domain. For instance, there is a metonymy that relates a 'person' with his 'face' so closely due to some kind of notorious beauty, as the kind of moon-like rays full of brilliance effulgence, which denotes a person who shines like that. Here we have registered a concrete example in which a 'face' is metaphorically predicated as 'moon'; and then, an integrated word 'moon face' that refers a 'woman' -in Sanskrit poetry, this kind of 'woman' would be considered a 'beautiful woman' par excellence.

Important to say, it seems probable that most of the type of part/whole spatial integrated words have an internal predication which is metaphoric: for instance, 'god Viṣṇu' is imagined as a 'person' (whence he could have a 'lotus navel'); 'god Brahmā' is imagined as an 'embryo' (whence he could have an 'egg form'); a 'cloud' can be imagined also as a 'person' (whence he could have a 'water womb'); etc. On the other hand, the part/whole grouping integrated words seems to be primary related to characteristics altogether associated with someone or something prominent: for instance, the 'hero Arjuna' is constantly associated in the narratives with the possession of a 'vigorous arch', an 'inexhaustible quiver', a 'divine shaft', etc., so as with the possession of an army whose banner is a 'monkey flag'.

2.3 Summary
Thus, it has been shown with these three examples (Section 2.1 and 2.2) how the morphological description of Sanskrit metonymic integrated words works in a truly Word-based model from a cognitive view. From here, it is presented a synthesis organized according to the type of tripartite interrelationship and the type of metonymic relationship in Table 4:

Table 4: Type of interrelationships and metonymic relations most frequent.

Type of interrelationship	Characteristic & entity	Part & whole	Cause & effect	Container & content	Material & object	Acción & participant	Vestment & person
Adj ●—● [N] ●—● **N**	15	7	6	4	2	3	1
N ●—● [N] ●—● **N**	4	8	0	0	1	0	0
Total	19	15	6	4	3	3	1

In Table 4 we present fifty-one integrated words analyzed by us just as an instance of frequency types. Taking into account only this six metonymic relationships, it is possible to say the most common is 'characteristic entity', which is above even from the prototypical relationship 'part&whole'. This means that, in the set of external predications studied here, there is a preference for selecting a prominent characteristic as a reference point. For instance, in order to design the hero 'Arjuna', one can refer to all those characteristics grouping around him (qualities, deeds, personality features, badge, decoration, etc.). Among these, Arjuna is known for employing a monkey image as a banner for leading his army. For this, the integrated word 'monkey flag' establishes a metonymic relationship with him on the paradigmatic plane.

The glosses presented in Figures 3 and 6 are the most general semantic functions. They represent a prototypically meaning from which it is possible to develop a network of related meanings. In examples like 'moon face', i. e. "(beautiful) woman", the relation of 'moon face' with "(beautiful) women" was categorized as a metonymic spatial relationship of part&whole. And the relationship of 'face' with 'moon' was categorized as a predication of quality. However, this last relationship can be analysed further as a metaphor, i. e. "a face that shines like the moon". This means that in this kind of Word-formation we have involved three different semantic processes: predication, metonymy and metaphor, all of them related to one morphological form.

3. Conclusions

In this paper we presented an alternative model to the Morpheme and Lexeme based explanation of external predication of the Sanskrit *bahuvrīhi* compounds. First, we saw how an 'exocentric head' is problematic because it leads us to a rather strange geometric analysis in which ´heads´ are outside the structure they supposed to head (Benveniste, 1977). Also because it is not an explicative concept in Morphology (Bauer 2008, 2016). Hence we depart from a formal criterion that classifies all compounds as endocentric and a semantic criterion according to which external predication can be viewed as metonymic instead of possessive, and can therefore be explained in cognitive terms by means of the notion of reference point. Then, we move to a definition of 'focus' as the whole word that percolates its grammatical functions to a tripartite morphological correspondence. The suggestion here in short is that it is better to term possessive compounds as metonymic integrated words and explain them as a kind of tripartite interrelationship according to the Word-based model that takes just the whole word as it unit of analysis.

We proposed a general scheme and some specific ones in order to explain how these integrated words participate in tripartite interrelationships. Every scheme represents the semantic integration of two different words in one integrated word. We did not use bases, lexemes, or other subunits but whole words and we have represented just the relevant phonological and categorical facts that are sufficient for formal linguistic knowledge. Moreover, we have provided tables demonstrating examples of a clear metonymic organization that shows how these integrated words are used in the language for design one or more referents.

From a cognitive point of view, the way metonymic integrated words functions is better explained by this model than by the dichotomy 'endocentric' vs. 'exocentric' head. It would be certainly interesting to apply this model for analysing a corpus of Vedic literature with the full gamut of accents. Besides, this explanation can be used for metonymic integrated words in other languages as well. Though there are many integrated forms to be analysed and the Word-based model proposed here is still evolving (see Hernández and Zacarías 2015, 2017), it seems to be a promising approach to describing the interrelations between Morphology and Semantics.

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