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Lexical subordination and compounding
Pāṇini's focusing on the non-head

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Abstract

In modern linguistics since American Structuralism onwards the notion of 'head' as 'the most important unit' has been the main target of the analysis devoted to syntagms and compounds. This notion nevertheless has some serious drawbacks, which are increasingly discussed from different points of view and methodologies in recent studies. In this paper we try to face some of these issues by interpreting them in the light of Pāṇini's marked choice of concentrating on the 'non-head' constituent of complex words – precisely on the *upasarjana*. Pāṇini's approach is here submitted to the attention of modern scholars by virtue of its accounting for the undeniable crucial role of the subordinate element whose specifying function with all its lexical and figural strength prevails over the identifying role of the head with which it combines.

Keywords: head, subordination, frozen case, *upasarjana*, Pāṇini.

1. *Aims and limits of the analysis*

This paper is dedicated to an analysis of Pāṇini's account of lexical subordination phenomena, with special focus on derivation and compounding[1]. The topic is of course crucial in most linguistic descriptions and Pāṇini's *modus operandi* is particularly worth a close scrutiny since it is radically different from the common approaches in modern linguistics. Our intent is thus to single out – from a definite linguistic angle – some important features of Pāṇini's description and interpret them in comparison with some well-known contemporary lexical and semantic theories. By doing this, more than attempting an evaluation or rating of any of these theories, our aim is to use comparison as a way of highlighting the linguistic and broader philo-

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[1] This paper is a joint work discussed and shared in its entirety by both authors. Maria Piera Candotti, however, is directly responsible for §§ 1, 2.1, 2.3, 3, 3.2, 4.1, and Tiziana Pontillo for §§ 2, 2.2, 2.4, 3.1, 4, 5. All translations are the authors', unless explicitly stated.

sophical implications of theoretical choices. Rigorous comparison, calls for interpreting differences «au sein même des ensembles dont elles font partie»[2]: only by recognising the inseparable link of each point of difference with the system that originated it we can bridge the gap between different cultural products and make comparison significant. We hope that what follows will trigger a deeper comprehension of Pāṇini's account of subordination phenomena in its linguistic, rhetoric and broader philosophical implications and provide some tools to uncover assumptions and repercussions of contemporary theories on subordination. A clearer awareness on such issues is, in our opinion, what must be principally desired from history-of-the-subject and comparative studies.

2. *Contemporary linguistic insights*

When it comes to describing subordination phenomena, a crucial syntactic and semantic principle of analysis in modern linguistics is that of 'headedness'. In particular, from American Structuralism onwards and especially in the contributions of generative morphologists, this has been the main target of the analysis devoted to compounds. In its earliest occurrences – as for instance in the very first study, i.e. in Bloomfield's *Language* of 1933, the notion of headedness actually concerns all kinds of syntactic constructions, including «two (or sometimes more) free forms combined in a phrase» (Bloomfield, 1933: 194) among which compounds. In a subordinative endocentric syntagm such as e.g. *poor John*, it defines that constituent «whose form-class is the same as that of the [resultant] phrase»(Bloomfield, 1933: 195). Bloomfield then uses this notion to identify the category of exocentric compounds, constructs, and phrases as those constructs whose resultant superior unit does not belong to the same form-category of any of the constituents. But he considers that «the exocentric constructions in all languages are few» (Bloomfield, 1933: 195)[3].

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[2]   As already pointed out in BIARDEAU (1964), a pioneering attempt to put in dialogue the philosophy of language of the Sanskrit tradition with Western philosophy and linguistics.

[3]   As examples from the English language he proposes the agent action construction (*John ran*) and cases of syntactic subordination: *if John ran*. Of course, from the point of view of Sanskrit, such a statement is at best a bit hurried: at least the productivity of the *bahuvrīhi* compound, envisioned as an alternate form of a syntactic construct, makes it difficult to relegate it to a marginal phenomenon.

Thus, and this is particularly important for our discussion, headedness became the basis of the common current distinction between endocentric and exocentric compounds, i.e. between compounds in which one or none of the respective constituents may be regarded as «the most important unit» in the syntactic unit (Scalise and Fábregas, 2010: 110; Bauer, 2012: 348)[4]. It is important to point out how, in these more recent studies, the focus for the identification of the head has shifted from a word-class, functional criterion to a semantic and syntactic one. Semantically, the head is defined as the most important unit insomuch that it is the constituent of the compound which denotes *the same object* that is denoted by the whole compound, for example (to use a classic Sanskrit compound) *vṛkabhayam* is the "fear of wolves" denoting a kind of fear and not a species of wolf. The compound has thus become a hyponym of its head.

Syntactically the head governs the syntactic agreement etc. in the sentence where the compound occurs. For example, a correct sentence (syntactic test) is (1):

(1) *tad*   *vṛka-bhayam*   *ugram*
     this.NOM.N   wolf.STEM.M + fear.NOM.N   mighty.NOM.N
     "This fear of wolves is mighty."

where the agreement of the pronoun *tad* and of the nominal predicate *ugram* in this nominal sentence is governed by the head *bhayam* "fear".

2.1. *Identifying the head of a compound*

A number of proposals have been made on how to identify the head of a compound[5]. The criterion of position was soon discarded, since it is actually a parameter depending on the single languages (Lieber, 1981; Selkirk, 1982). For example in Germanic languages the compounds are generally right-headed (e.g. Engl. *rock band*; Germ. *Rockband*) *versus* left-headed compounds in Romance Languages (It. *gruppo rock*). Moreover, we can add that even within the same language, the position of the

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[4] Nevertheless, as will be discussed below § 2.3 a strict relationship between the definition of exocentricity and that of headedness does not work fully satisfactorily in all cases. Or better, different ways of identifying the head may lead to different judgements on the exocentricity or endocentricity of the construct.

[5] For a classic list of parameters adopted for identifying the head of a syntactic structure see e.g. Scalise and Vogel (2010: 8).

head may be subject to numerous exceptions (2a) as against the default word order (2b):

(2a) Skr. *naravīra-* "man-hero"   →   "heroic man"
(2b) Skr. *vīrapuruṣa-* "hero-man"   →   "heroic man"[6]

Thus, several other criteria have been used for the identification of the head. One of the most widespread and fruitful consists in concentrating on what is known as 'percolation', i.e. the transmission of the properties of one constituent to the whole compound. As a consequence, the head in a compound is the constituent whose properties are transmitted, by means of this so-called percolation, to the whole compound. In particular, different theories focused on several different linguistic properties to be transferred. We can thus speak of the percolation of:

– the grammatical category (cf. Lieber, 1981):

(3)   *utpalam*   →   *nīl(o)tpalam*
      "Nymphaea.NOUN"   "blue.ADJ" + "Nymphaea.NOUN" = NOUN

– the morphological features (cf. Booij, 2007), such as gender:

(4a) *utpalam*   →   *nīlotpalam*
      "Nymphaea.N"   "blue Nymphaea.N"
(4b) *dāru*   →   *yūpadāru*
      "wood.N"   "sacrificial post.M" + "wood.N"
                                      = "wood for the sacrificial post.N"

– the semantic type (cf. Allen, 1978):

(5a) *utpalam*   →   *nīlotpalam*
      "Nymphaea"   "blue Nymphaea"
      hyperonym   hyponym of *utpalam*

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[6]   The example *naravīra-* is quoted by Renou (1961: 109). This kind of compounds is variously interpreted by modern scholars, we follow here Renou's interpretation who is more in tune with traditional Pāṇinian interpretation. Renou analyses these compounds as *karmadhāraya* compounds with inverted order of constituents but nevertheless does not deny a specific semantic input as he specifies that «l'inversion apparente des éléments atteste la tendence que ont tous ces composés d'apposition à mettre au dernier terme le nom qui marque la catégorie». As for the postulation of the origin of the Indo-European appositive compounds from the early combination of a proper or common noun with a classifying noun and even with a very early script determinative, see Bauer (2017: 34-61). Traditional grammar already accounted for cases where the position of head and nonhead is not the predicted one; see below, § 3.1.

(5b) *dāru*   →   *yūpadāru*
     "wood"   "wood for the sacrificial post"
     hyperonym   hyponym of *dāru*

2.2. *Limits in the concept of percolation*

Yet, none of these 'transferences of properties' works in a fully satisfactory way. Contemporary scholarship has variously pointed out the difficulties stemming from any of the preceding criteria[7] and from the notion of head itself, at least when it comes to the syntactic analysis of compounds[8]. It is not the place here to retrace all the steps of the discussion, it is nevertheless important to highlight at least the major points of difficulty in order to correctly evaluate the import of Pāṇini's proposal. First of all, the percolation of grammatical category does not prove useful in all the, numerous, compounds with words sharing the same grammatical category (see e.g. *yūpadāru*). Moreover, the two most common grammatical categories involved (i.e. substantives and adjectives) are not so easily and straightforwardly distinguished. In fact, the category of adjective itself is quite a recent one in Western studies[9] and its heuristic adequacy in accounting for some languages, including some ancient Indo-European languages and Sanskrit in particular, is subject to question[10]. There has been an increasing awareness, triggered in particular by typological studies, of the difficulties in discovering some commonly shared morpho-syntactic features to discriminate substantives from adjectives[11]. The most relevant

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[7]   See, e.g. BAUER (2014: 18): «Numerous linguists of various schools have tried to find a definition of head; yet no one, as far as I know, has found a single, unambiguous definition that can be used for all grammatical structures».

[8]   See, e.g. the recent lexicalist attempt by LOWE (2015).

[9]   For a history of the birth of this category in Western studies see ALFIERI (2014; 2015). Alfieri shows how the tripartite classification we tend to take for granted between (ALFIERI, 2015: 361) «the noun meaning the substances, the verb meaning the actions and the adjective meaning the qualities» is not shared by Greek and Latin grammarians who worked with a fundamental bi-partite classification between nouns and verbs, much more similar to the one upon which Pāṇini's grammar is built. ALFIERI (2014: 157) also shows how the tripartite approach is deeply linked with a logical/ontological outlook rather than a linguistic one, which characterized the re-interpretation of Aristotle's categories in the Middle Ages: «If language and ontology coincide, as medieval commentators supposed, the same notions should find their expression in all languages and all languages should show the same grammatical categories, the noun, the verb and the adjective».

[10]   See among many others COMRIE (1993: 101, 104) for Indo-European studies.

[11]   Cf. the seminal work of Robert DIXON (1982) *Where have all the adjectives gone?* which radically questioned the presence of a class of adjectives in some languages. Such a strong tenet has been partially disavowed in DIXON and AIKHENVALD (2004), where the authors suggest that in

of such features, that is the presence of a fixed gender for substantives, is of course relevant only for languages with gender marks and is not fully satisfactory even there[12]. The risk is having recourse to the notion of headedness itself in order to discriminate adjectives from substantives, as done in Hajek (2004: 355: «Adjectives are rarely reported to function as head of the noun phrase. Such a criterion is therefore extremely useful in distinguishing between adjectives and nouns»), which, from our present point of view, ends up in a circular argument.

Last but not least the categories of substantive/adjective are also particularly slippery in the field of semantic studies. If it has been maintained for some time that adjectives are semantically vague (i.e. that they have a semantic gap, a set of elements for which it is not possible to say whether they are part of the denotation or not, e.g. *tall*), whereas substantives are intrinsically 'sharp' (i.e. it is always possible to say whether a given element is part of the denotation or not, such as in the case of the substantive *table*), it is nevertheless hard to consider such a distinction as shell-proof anymore. This is partly due to the development of the so-called semantics of the prototype, which, in its attempt to bridge the gap between semantic and cognitive data, has proved at will the intrinsic vagueness of most of the substantives. By the way – even making an abstraction of the specific tenets of that school – it is a matter of everyday experience that there are adjectives (such as *odd* in the expression *odd numbers*) with a semantic gap tending to zero and that there are also substantives with relevant gaps (*a child*).

In a similar way, even the other features (gradability, dimensionality and so on) used to distinguish adjectives from substantives are not unfailing as there is a consistent number of in-between cases which are hard to account for[13]. We suppose that we can content ourselves with just one example, particularly important for the continuation of our discussion. Adjectives typi-

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all languages there is always some albeit rather subtle-grammatical criteria for distinguishing the adjective from other word classes.

    [12] Consider substantives with gender variation common in many Indo-European languages, such as it. *cavallo* m./*cavalla* f. "horse" vs *cavallo* m./*giumenta* f. Other possible discriminating features may be the use of comparatives or the non-co-occurrence with possessive pronouns, yet none of these identify an adjective class unquestionably. See also Bhat (1994) who claims that while it is improbable that one single discriminating criterion could cover all languages, sets of (interconnected) criteria may prove useful both in differentiating adjectives from other classes (in languages with adjectives as a formal distinct category) and in identifying them with other classes (for languages in which adjectives do not form a distinct category).

    [13] For a good re-discussion of most of these, one can refer to Sassoon (2013).

cally elicit one-predicate comparisons (6a), while substantives are characterized by inter-predicate comparison (6b):

(6a) Engl. *Marc is taller than John.*   but [?]*Marc is more a professor than John.*
(6b) Engl. *Marc is more a professor than a researcher.* but [?]*Marc is taller than thinner.*

Yet some substantives can also generate one-predicate clauses, such as in (6c):

(6c) Engl. *Marc is more a child than John*[14].

When it is possible to express the gradability of a given nominal, as happens in cases such as *taller* mentioned above, it is said that the nominal has an accessible dimension: this is considered a characteristic feature of prototypical adjectives; nevertheless, as shown by the examples above, substantives also have several dimensions which, in some situations, can be accessed and used to measure other meanings, as in the case of *Marc*, measured by his childish behaviour with respect to John. At this point one could even wonder whether there is a category to percolate at all.

The percolation of morphological features from the head to the other constituents, in particular of gender marks (see e.g. *yūpadāru*), presents the same difficulties of the previous one, perhaps even greater. Of course the feature is useless in those languages where no gender mark exists and even within gendered languages there are numerous examples where the feature cannot be used because all the members share the same gender.

Coming now to the third criterion, that is the percolation of the semantic type, it must be pointed out that, in some cases, it conflicts with the other two. For instance, in the Italian phrase *testa di legno* lit. "wooden head", an exocentric structure said of a stubborn person, a still different morphological head may be identified, namely *testa* "head.F", as the matching plural form shows in the following sentence referred to masculine referents:

(7) It. *Sono entrate le teste di legno.*
     "The wooden heads.PL.F entered.F"

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[14] In some languages, such as Italian, this is made even more evident by the absence of the, otherwise expected, article: *Marco è più bambino di Giovanni* vs [?]*Marco è più un bambino di Giovanni*.

The drawback of using the notion of head is particularly evident in the case of the exocentric compounds. Among these we find the well-known 'possessive compounds' (8a, b) such as Engl. *pale-face*, *red-skin*, *paper-back*[15], but also the so-called 'synthetic compounds' (9) such as Engl. *pickpocket*, It. *asciugacapelli* "dry" + "hair" → "hair dryer", in which the first member is given a verbal status, and even co-compounds in which none of the constituents is a hyperonym of the whole compound:

(8a)   Skr. *satya-dharmaḥ*
       truth.N + religion.M
       "[Somebody] whose religion is the truth.ADJ.M"
(8b)   Skr. *uddhṛt(au)danā*
       taken away.VB.ADJ + rice.NOUN.M
       "[Something denoted by a feminine noun: e.g. *sthālī* "a pan"] from which rice is
       taken away/drawn out.ADJ. F"
(9)   Skr. *mātapitarau*
       "Mother and father = parents"[16]

In all such cases, the compound is not a hyponym of one constituent, i.e. no constituent can be defined a hyperonym of the compound (Štekauer, Valera and Körtvélyessy, 2012: 80). On the other hand, it is not possible to say that there is never an identifiable head inside such compounds: besides the above-mentioned example *testa di legno*, where the morphological head is identifiable, even in compounds such as *red-skin*, internal hierarchy is undisputable, although the hypothetical internal head fails all three tests of percolation[17]. Somehow the whole criterion of percolation cannot be applied so smoothly in case of exocentric compounds, since the status of the head itself is either absent or problematic.

[15]   While, in all probability, exocentric compounds were originally adjectival formations, and hence they are commonly termed possessive compounds (see e.g. the Germ. term *Possessivkomposita*, referred by THUMB and HAUSCHILD, 1959: 410-412 to both the old Greek *rhodo-dáktulos* and the old Indian *bahu-vrīhiḥ* types), most of the English examples are not (see e.g. BAUER, 2012: 351). Moreover, we should just recall JACOBI's (1897: 83 ff.) intriguing hypothesis according to which *bahuvrīhi* compounds might have played the role of a subordinate (relative) clause inasmuch as such clauses did not exist in the ancient Indian languages for a long time. On the other hand, we know that the relative pronoun could not have been such an early invented device devoted to adding pieces of information to the main sentence or better, merely about a unit included therein.

[16]   This is an example of class-maintaining co-compound, in the sense that noun + noun → noun. Many languages also have examples of class-changing co-compounds, following patterns such as adjective + adjective → noun.

[17]   Cf. BAUER (2008: 58-59). This, by the way, is not restricted to exocentric compounds. It has been noted (see ZWICKY, 1985 quoted by BHAT, 1994: 266-267) that different sets of discriminating features generally identify different constituents as heads in the constructs in which they occur.

2.3. *Limits to internal analysis of compounds*

In terms of Natural Morphology, exocentric compounds deviate from the binary, syntagmatic structure of motivated words, according to which each word-formation syntagma is based on the identification-specification scheme relation, where the *determinatum* identifies and the *determinans* specifies (Kastovsky, 1982: 152). Moreover, as has already been pointed out (Dressler *et al.*, 1987: 102), the most natural coinages are in fact the most diagrammatic ones, where a new meaning is accompanied by a new form. If the new meaning is added to *satya-* + *dharma-*, a new word-form is expected, while there is no additional word-form.

Yet, it is difficult to simply dismiss exocentric compounds as merely a marginal and unproductive category. Some languages, including Ancient Greek and Sanskrit show that the category is consistent and, more importantly, productive[18]. In order to offer a linguistic interpretation of the phenomenon of exocentricity, Whitney (1889: 501-502), followed by many recent scholars[19], postulated a zero morpheme conveying the meaning of 'having', which might diagrammatically represent the additional word-form and convey the additional meaning of the compound. By contrast we know that Pāṇini, even though he made an extensive use of zero-replacements in word-formation patterns, did not involve this device in describing the morpho-syntactic pattern of exocentric compounds.

Instead, the structuralist approach merely inscribes this linguistic phenomenon in the framework of the general tendency of speakers «to see a thing identical with another already existing and at the same time different from it» (Marchand, 1960: 11). Or, to put it another way, that these are examples of cases where the tendency towards the economy of expression overpowers the opposite trend towards the clarity (Ten Hacken, 2012: 358). It is thus not surprising that, among the latest studies on exocentric compounds we find the proposal to interpret most of them as figurative usages of endocentric compounds, be they metonymic or metaphoric. This is explicitly stated by Bauer (2008) as an alternative to the zero-reading:

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[18]   As shown by the two rules A 2.2.23-24 *śeṣo bahuvrīhiḥ / anekam anyapadārthe*, "The remaining compounds are *bahuvrīhi* compounds. [They are] more than one word used in the meaning of another object of word" which teach such exocentric formations almost without restrictions. The rules will be commented on below (§ 4.2).

[19]   See e.g. Kiparsky (1982: 20) and Gillon (2007).

The alternative analysis is to say that there is no zero element at all, and these constructions are not exocentric. Rather they are interpreted according to the figure of speech synecdoche (sometimes called 'pars pro toto'). So *redcap* is a perfectly regular endocentric compound with a right-hand head, but it is interpreted as 'person who is habitually associated with a red cap' in much the same way as *crown* is interpreted as 'person or group of persons who are habitually associated with a crown' in the sentence *The Crown will not impose any charges for the use of its intellectual property.* (Bauer, 2008: 59)

Nevertheless this choice of interpreting the phenomenon of exocentricity on purely rhetoric grounds is not without flaws, considering that there exist at least some room for morphology in some languages, as testified by the retraction of accent that characterizes *bahuvrīhi* compounds in Sanskrit and by the marginal use of suffixed forms alternating with pure compounds.

2.4. Determinans *vs* determinatum: *fuzziness in the construction of meaning*

The semantic notion of heads shows some drawbacks also from the point of view of a more cognitive-oriented approach. The *determinatum/ determinans* relation, which is intimately connected with the analysis of the head as percolating its own semantic type to the meaning of the integrated form[20], has some limits in terms of its potential in describing the process of construction of meaning. Of course, the pattern remains a crucial means for the speaker (to stay with Sassoon, 2013: 55 based on Hampton, 1987) «to generate a gradable interpretation for the infinitely many possible complex expressions in language»[21], nevertheless it does not fully exhaust the description of the creation of complex/integrated meaning. Although the dimension set (that is the set of characterizing features) of the modified nouns is largely predictable from the union of the sets of the parts, yet,
– some dimensions fail to be inherited; in *male nurse* the dimension [+ feminine] of *nurse* is not inherited by the whole syntagm;
– other dimensions only characterise the whole and are not found in the parts: *pet birds*, for example, prototypically live in cages, a dimension

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[20] See KASTOVKSY (1982) already quoted (§ 2.3).
[21] As the author points out this allows the comprehension also of partially contradictory constructs such as *being red or white* or *male nurse*.

which does not come either from the notion of *pet* or from the notion of birds[22].

Therefore it is not possible to represent the construction of meaning as unidirectional and compositional, since all the meanings in an integrated form interact and modify each other. Even in simple cases such as "the blue Nymphea", as Sanskrit grammarians perfectly knew, there is no pure *determinatum* and pure *determinans* as both meanings modify each other: blueness is characterised as residing in a flower and the flower as being blue (see below, § 3.4). On the other hand, if one must find a predominant function in the construction of meaning, it should be that of the determinant since it has been proved that typicality ratings in modified nouns correlate more strongly with their rates in the modifier than in the head noun (Sassoon, 2013: 60): typicality ratings in *a man who is a liar* correlate more strongly with the dimensions of *liar* than with the dimensions of *man*. In other words the modifier plays a more crucial role in the construction of the final, integrated concept: *man* might be the hyperonym of the modified noun (a kind of man) but *liar* is crucial in identifying the specific referent.

This survey is not meant to be exhaustive. Nevertheless we hope that some points do emerge clearly and before moving on to the study of subordination phenomena as tackled by Pāṇini's grammar we would like to spell out some of them. First of all it seems necessary to highlight the ontological bias on the question of headedness in Western studies and its usage in classifying linguistic phenomena of subordination: the head is «the most important element» inasmuch as it determines the element in the real world denoted by the phrase or syntagm. We have seen how such an interpretation, which is strictly linked with the development of the recent, problematic, categories of noun and adjective, has shown some limits and, what is more, has not proved to be always consistent with the other means of identifying the head. On the other hand from the point of view of semantics and cognitivist research there has been an increasing awareness of the role of the so-called subordinate element in the construction of meaning. A second point of interest is the growing debate around endocentricity and exocentricity as a means to classify compounds and the tendency to interpret exocentricity

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[22] For a discussion of this and other data concerning the inheritance of attributes in natural concepts see HAMPTON (1987).

more as a function of the whole word than as a result of the internal analysis of the compound and of the identification of the head.

3. Upasarjana *as a means to describe subordination phenomena*

We shall now turn to Pāṇini's description of compounds, which is constructed upon the concept of *upasarjana*, literally denoting the "action of pouring [something] upon [something else]". In other words, his analysis and the consequent classification of compounds does not focus on the head, but rather it relies on the non-head of each compound.

Pāṇini defines the concept of *upasarjana* in two rules, linked to each other through the copulative conjunction *ca*. The first rule simply states that each time Pāṇini identifies the *upasarjana* in the rules themselves by stating it in the nominative:

(10)   *prathamānirdiṣṭaṃ samāsa upasarjanam* (A 1.2.43)
     "What is stated by means of the first ending in a compound-[rule] is called *upasarjana*."

This is a metarule that has to do with the interpretation of Pāṇini's frame to teach compound. The analytical frame through which most of compounds is presented is *X*.NOM. + *Y*.INSTR. As a consequence, e.g. in (11) we know that the *upasarjana* costituent is the inflected word denoting a qualifying property, because it is inflected in the nominative case in the specific wording of the relevant rule.

(11)   *viśeṣaṇaṃ*   *viśeṣyeṇa*   *bahulam* (A 2.1.57)
     qualifying.NOM   qualified.INSTR   variously.ADV
     "[An inflected word denoting] a qualifying property variously combines with [an inflected word denoting] a qualified [object, to form a compound]."

Nonetheless, there are compound-rules where, if Pāṇini were to content himself with this single definition rule, problems would arise. For instance, in (12a) the units which are mentioned in the nominative, namely the indeclinables, *ku*, *gati*, *pra*, *ati*, *nis* etc., are in fact *non-upasarjana*s.

(12a) *ku-gati-prādayaḥ* (A 2.2.18),
     "[The indeclinable *pada*] *ku*- and the units termed *gati* (A 1.4.60) or included in the list beginning with *pra*- (A 1.4.58) [compulsorily combine with an inflected word, to form a *tatpuruṣa* compound]"

To content ourselves with a traditional example, in (12b) it is quite evident that the indeclinable particle *nis-* (expressed in the nominative) cannot be the *upasarjana* of the compound.

(12b) *niṣ-*   *kauśāmbiḥ*
        out of.PREV   Kauśāmbī.NOUN.F
        "[Somebody who has departed] from [the town named] Kauśāmbī.NOUN.M"

This is clarified in the traditional analysis of the compound as (12c):

(12c) *nis-*   *krāntaḥ*   *kauśāmbyāḥ*
        out of.PREV   gone.PPP.NOM.M   from Kauśāmbī.ABL.F

Thus, the second definition rule states that the *upasarjana* is recognizable even when it is not stated in the nominative and it does not occupy the first slot of the compound[23]:

(13) *ekavibhakti cāpurvanipāte* (A 1.2.44)
     "And what has one single ending, even when it is not in the first place [is the upasarjana]."

Independently of the case ending which applies to the resultant compound when it is used in a sentence – case ending which matches that of its head in the constituent analysis[24] – the non-head constituent is fixed once and for all. Again, following the traditional analysis, we can see how in the example in Table 1 *niṣkrāntaḥ* is inflected in different cases while *kauśāmbyāḥ* remains unchanged.

niṣkrāntaḥ "A departed.NOM"		→ *niṣkauśāmbiḥ* "[A man] coming from Kauśāmbī.NOM.M"
niṣkrāntam "A departed.ACC"	*kauśāmbyāḥ* "from Kauśāmbī.ABL.F"	→ *niṣkauśāmbyam* "[A man] coming from Kauśāmbī.ACC.M"
niṣkrāntena "With a departed.INSTR"		→ *niṣkauśāmbinā* "With [a man] coming from Kauśāmbī.INSTR.M"[25]

Table 1. *Compound with frozen case in second position.*

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[23] The present reading of the two rules simultaneously – already advanced in Pontillo (2003) – partially deviates from traditional interpretations, but it seems to solve both the supposed 'redundancy' of *ca* and the asserted mis-positioning of 1.2.44 which Joshi and Bhate (1983: 217) indicated as a difficulty.

[24] The so-called *vigraha*, according to the indigenous current grammatical analysis.

[25] Example from KV on A 1.2.44.

The last condition enunciated in the rule ("when it is not in the first place") self-evidently refers to a quite common feature of endocentric Indo-European compounds, which is also clearly explained in another group of rules, which actually consist of one general rule and two exceptions: the default location for the non-head constituent is the first slot in a compound (14), whereas the reverse positioning must be accounted for by specific exception-rules such as A 2.2.31 and 38 which teach the second position for the *upasarjana* in restricted cases.

(14)   A 2.2.30 *upasarjanaṃ pūrvam*,
      "A constituent termed *upasarjana* is placed first [in a compound]."

3.1. *The morphological role of* upasarjana

The *upasarjana*-status of constituents is involved in establishing some crucial morphological restrictions in Pāṇini's formation of nominal compounded or derivational stems, which go far beyond the simple parameter of position, as the following actually productive rules clearly show:

(15)   *go-striyor upasarjanasya* (A 1.2.48)
      "[The final vowel of a nominal stem is replaced by a short vowel] when the nominal stem ends in the word *go* or in a feminine-affixed word, provided that these words are termed *upasarjana*s."[26]

This is why the final vowel of the above-mentioned example (*niṣkauśāmbi-*) is short, even though its etymon is a feminine word ending with a long vowel. Conversely, another set of provisions headed by A 4.1.14 concerns on the other hand constituents which are not *upasarjana*.

For instance, A 4.1.15 teaches to apply a feminine derivational affix *-ī* to several kinds of stems, including the primary derivative nominal stem *-cará-* "who wanders". Accordingly, the feminine affix *-ī* actually applies e.g. to the feminine nominal primary derivative stem *kuru-car-ī-* "wandering in the Kuru country.F", while it does not apply to the feminine nominal stem *bahu-kuru-carā-* "city (*nagarī*) where there are many wanderers from the Kuru country.F", where *cara-*, as a member of a *bahuvrīhi* compound, is an *upasarjana*.

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[26] Two examples offered by commentaries are *citraguḥ* "having brindled cows" as opposed to *gokulam* "a herd of cows" and *niṣkauśāmbiḥ* "who has departed from Kauśāmbī" vs *rājakumarīputraḥ* "son of a princess".

Similarly, A 4.1.54 teaches an option between the derivational feminine affix *-ā* and *-ī* for a specific set of nominal stems playing the role of *upasarjana*s. Accordingly, this option applies to the *upasarjana* compound nominal stem *candramukhī- / candramukhā-* "moon-faced", but not to the negative *tatpuruṣa* stem *aśikhā-* "without crest", where neither *śikhā* nor *aśikhā* are *upasarjana*s[27].

Some other rules (e.g. A 6.2.104) show how *upasarjana* is a technical term which also indicates the non-head constituent in secondary derivation.

(16)   *pūrvápāṇinīyāḥ*
        "ancient disciples of Pāṇini"
        (*pāṇini-* is the *upasarjana* of the *taddhita* derivative stem *pāṇinīya-* "disciple of Pāṇini")

To sum up, *upasarjana*:
a.   is a constituent in both compounding and secondary derivation,
b.   has fixed position in the syntagm, mostly the first place, i.e. the left-hand constituent,
c.   may trigger some specific morphological rules,
d.   has no syntactic valency outside the compounded/derivational stem, because its 'activity' is exhausted inside the syntagm.

It is only in this perspective that *upasarjana* – which is consistently not defined on semantic grounds in Pāṇini's grammar – is 'a subordinate constituent', namely because it is not independent at the morphological and syntactic level. And this is indisputably true, even though that same 'subordinate constituent' is essentially active in the construction of the final meaning of the resultant (compounded or derived) nominal stem.

3.2. Determinans *vs* determinatum *in Pāṇinian grammar*

As we have seen, the *upasarjana* is thus principally identified in Pāṇini's grammar through morphological and syntactic features. At this point one could wonder whether there is a role for semantics in the comprehension of linguistic subordination or, in other words, what possible

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[27]   Negative compounds (*nañ-tatpuruṣa*) are classified by Pāṇini (A 2.2.6) as *tatpuruṣa* with only the first constituent (the negative particle itself) as *upasarjana*.

role the opposition *determinans/determinatum* plays in accounting for subordination. Early commentators were already aware of the difficulty of singling out the specific features of these determinant constituents, as is already apparent e.g. in Kātyāyana's comment on the inefficiency of the principle of distinction between a qualifying and a qualified word in compounds whose order of constituents is admittedly liable to an extended optionality, as established in the above-mentioned rule A 2.1.57 (§ 3). In fact, the classification of one of the constituents as an *upasarjana* derives from the enunciation of the term *viśeṣaṇa* in A 2.1.57 in the nominative case (A 1.2.43: see above § 3), but Kātyāyana defined it as an "unsettled matter":

"Because of the condition of being a determinans proper to both, the determinans and the determinatum, and because of the condition of being a determinatum, again proper to both, there is no certitude in establishing [which one is] the *upasarjana*."[28]

In compounds where the two members pertain to the same lexical category, for example where both are nouns, such as (16a, b) the analysis is indeed intrinsically ambiguous.

(16a)   *mukha-candra-*
        face.STEM.N + moon.M
        "face-moon.M"
(16b)   *rājarṣi-*
        king.STEM.M + seer.M
        "king-seer.M"

Is *mukhacandra* a shining and round feminine face envisioned as a moon (a moon-face) or a moon which is so fascinating that the poet dreams of his female partner's face? And what about the compound *rājarṣi-*? Is he a real king or an extraordinary (literally kingly) ascetic man? Is he an ascetic who plays the role of a leader or a leader who behaves as if he actually were an ascetic? But, as already emphasized in Candotti and Pontillo (2011: 73-74) such a decision is not even plain when one word which is generally used to denote a substance combines with another one denoting a quality, as happens in (16c) where everyday usage blocks the order of *padas* in the form

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[28]   M 1.399 ll. 4-5, Vt. 1 *ad* A 2.1.57: *viśeṣaṇaviśeṣyayor ubhayaviśeṣaṇatvād ubhayoś ca viśeṣyatvād upasarjanāprasiddhiḥ.*

kṛṣṇa-tilāḥ, whereas the relationship between *determinans* and *determina-tum* does not allow to identify a unique *upasarjana*[29].

(16c) *kṛṣṇa-tila-*
      black.ADJ + sesamum.NOUN.M
      "black sesamum.NOUN.M"

A determined (qualified and/or identified) utterance is regularly the output of a dynamic relation between two constituents, even when the surface linguistic structure only includes one of the two constituents which can be recognized in the matching deep structure. This occurs in the usage of substantive adjectives, such as in the following example taken from Patañjali[30] when, in a liturgical context, it is required to bring "the white [one]" (*śukla-*.ADJ) or "the black [one]" (*kṛṣṇa-*.ADJ), with reference to a he-goat; if one takes something else which is white such as a ball of ground rice, he does not carries out what is required.

The mention of the mere colour-name to refer to an object designated by its colour is based on a common linguistic usage. The function of the colour-name, i.e. of the determinant constituent of the deep level combination "a black he-goat" goes beyond the aim of qualifying a substance, as the counterexample shows. The ritual rule is not put into practice by taking another 'black' substance. It is therefore clear that the mutual relation between the specifying and the specified constituent of such a kind of deep level linguistic combinations simultaneously re-determines both constituents. This is defined by indigenous Sanskrit grammar as *vṛtti* i.e. literally as a "revolving change" of the constituents[31].

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[29] M 1.399 ll. 7-10 ad A.1.2.57 Vt. 1: "The linguistic unit *kṛṣṇa-* 'black' when it is connected with the linguistic unit *tila-* 'seed', occurs as an expression of a specifier. Analogously the linguistic unit *tila-* 'seed' when it is connected with the linguistic unit *kṛṣṇa-* 'black', occurs as an expression of a specifier. Both can become a specifier and both can become something that is specified".

[30] M 1.399 ll. 23-24 ad A 2.1.57 Vt. 2; M 1.42 ll. 8-9 ad Vt. 13 ad A 1.1.1.

[31] Bhat (1994: 91-118) prefers to think in terms of de-categorisation and re-categorisation and shows how a given word category, when used outside its regular or categorial use looses some of its caracteristic features and assumes others. Even though it had often been restricted to the specific mechanism of a derivative nominal stem from a prepositional phrase, such as Sanskrit *ánuvrata-* "faithful" from *ánu vratám* "according to the observance" or Greek ἐνάλιο- "marine" from ἐν ἁλί "within the sea" (see the analysis of these two examples respectively in Rousseau, 2016: 5, 45), the term "(syntactic) hypostasis" has also been used to label the use of a combination of two inflected forms as basis of a new flection or derivation, exocentric compounds included (see e.g. Brugmann, 1906: 72).

Pāṇini seems fully aware of such limits in the semantic analysis, when he prefers to avoid any evaluation of the "prevalence" of one constituent upon the other(s) and to promote an analysis of phrases which is strictly based on purely morphological and syntactic relations between constituents[32]. The independence of the notion of *upasarjana* from purely semantic considerations is evident also from his treatment of the so-called comparative compounds:

(17a) *śastrī-śyāmā-* [*devadattā*]
       knife.NOUN + black.ADJ
       "knife-black" [Devadattā]
(17b) *puruṣa-vyāghra-*
       man.NOUN + tiger.NOUN
       "tiger man (i.e. that tiger of a man)"

These examples come from a couple of Pāṇini's rule (A 2.1.55-56) exceptions to A 2.1.57, which we have analyzed in detail in Candotti and Pontillo 2017 where we proposed a fresh interpretation of both rules with ample discussion of the relevant issues. The first case is, accounted for by rule A 2.1.55 as a compound where the *upasarjana* – even though a substantive – plays, as predictable, the role of *determinans* (more specifically of an *upamāna*, a measurer) with respect to a second constituent with adjectival features (a word denoting something general):

(18)   *upamānāni*   *sāmānya-vacanaiḥ* (A 2.1.55)
       standards.NOM.N.PL   with words denoting something general.INSTR.M.PL
       "Inflected words which are standards[33] combine with [inflected words which are
       co-referent and which] denote something general [to optionally derive a *tatpuruṣa*
       karmadhāraya compound]."[34]

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[32]   The struggle to maintain semantics outside the domain of grammar is also demonstrated by a couple of rules which have been handed down as a part of Pāṇini's grammar, even though their authorship has often been questioned (for a broad survey of scholars' evaluations, see Cardona (1976: 158-159; 193-194; 322, n. 68-73; 332-333, n. 192). These rules (A 2.1.55-56) discard the teaching of the *pradhāna* "principal member" (for which see § 4), the meaning of affixes, the meaning of time and the *upasarjana* itself as not pertinent to grammar, because meaning does not have grammar as its instrument of knowledge.

[33]   *Upamāna-* is lit. "an instrument used to measure" according to A 3.3.117.

[34]   The terminology involved in this rule and in the following one, i.e. *upamita*, *upamāna*, and *sāmānya*, is currently read as if it were part of an *alaṃkāra*-description of a simile, that is to say, by interpreting the single terms as subject of the comparison, object of the comparison, and *tertium comparationis* of a simile respectively. Such an interpretation is grounded on some hints coming directly from Kātyāyana and Patañjali as recorded in the commentary on A 2.1.55, which, nevertheless, has some serious drawbacks. See Candotti and Pontillo (2017: 361-369).

Against the traditional interpretation "[Devadattā] who is as black as a knife" which interprets the general property as the 'property shared' by the subject and the object of comparison, i.e. the 'measured' woman and the knife, our analysis of the compound is thus fully resolved within the members of the compound, interpreted as a "knife-black", a shade of black, by means of a construction also found in other languages, for example:

(19a) It. *verde mela*   lit. "apple-green" (a shade of green)
(19b) Engl. *nightblue*   (a shade of blue)

Even more extreme is the case of *puruṣavyāghra-* "that tiger of a man"[35] accounted for by A 2.1.56 where what is measured (*upamita*) is the *upasarjana*:

(20)   *upamitaṃ*   *vyāghrādibhiḥ*
       A measured.NOM.SG   with 'tiger' and so on.INSTR.PL
       sāmāny(ā)prayoge (A 2.1.56)
       when a word denoting a general quality is not used.LOC.SG
       "[A nominal *pada*] denoting an object to be measured [optionally] combines with
       a nominal *pada* of the *gaṇa vyāghrādi*, provided that a nominal *pada* denoting
       a common/general quality is not used, [to derive a *tatpuruṣa karmadhāraya*
       compound]."

Here again, tradition – which, let us remember, favoured a head-centred approach – has proposed different analyses. However, from a strictly pāṇinian point of view, we maintain that here we are dealing with an identification ("tiger-man"), where "man" (*puruṣa-*) should be what is semantically measured by "tiger" (*vyāghra-*), but at the same time also the *upasarjana* in the compound. In other words what is measured here, i.e. "a man", also covers the role of a kind of *determinans* of the head noun "tiger"[36]. We could thus interpret it as "a tiger who is a man indeed"[37] or "tiger in human form" identifying, among the different kinds of tigers, the human one. We thus have a compound in which each of the elements interacts in the construction of the

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[35] For a generative approach to such a predicative reading of *puruṣavyāghra-*, which resorts to the Dynamic Antisymmetry perspective, see MOCCI and PONTILLO (2019).
[36] The choice between *determinans* (*viśeṣaṇa*) and *determinatum* (*viśeṣya*) undoubtedly becomes relevant at least from Kātyāyana's *vārttika*s onwards, when the term *upasarjana* becomes a synonym for "what is not principal" (*apradhāna*). On the equivoque that is assumedly derived from the transition from the grammatical to the rhetorical tradition of *rūpaka*-analysis, see PONTILLO (2009: 18 ff.).
[37] Cf. e.g. the translation of *mukhacandra* as "cette lune qu'est le visage", of *saronṛpāḥ* as "les rois que sont les étangs" by PORCHER (1982: 154, 164).

final meaning, the non-*upasarjana* which governs the syntax and the basic denotation of the final word and the *upasarjana* which is the measured and which at the same time constructs the specificity of that denotation. This helps us to better interpret those compounds where the *upamāna* "standard of comparison" is considered to be the real focus, e.g. in the *kāvya*-poetry and in the most ancient poetic tradition. In compounds such as the already mentioned *mukhacandra-* "moon-face", the standard of comparison, that is the moon, consistently plays the role of the non-*upasarjana*, i.e. of the member which holds the denotative burden, enters into a syntactic relationship with the other elements in the phrase, and fashions the morphological shape of the whole compound.

The divarication between morphology and semantics is here clearly spelled out: the *upasarjana* is said to play the role of the 'measured', i.e., in a rhetorical perspective, of the subject of comparison and a kind of implicit final referent not of the syntagm (where the referents are respectively the tiger and the moon) but of the whole metaphorical sentence.

4. Upasarjana *as a means to interpret compounds*

Now we shall try to focus on the advantages that descend from this *upasarjana*-oriented analysis of secondary derivational stems and of compounds, i.e. from Pāṇini's marked choice of merely concentrating on the non-head constituent of these complex words. In fact, he seems to have deliberately dismissed the analysis of compounds based on the identification of the head (*pradhāna*), which possibly had even been in use at least before Kātyāyana's age, as proved by Radicchi (1985: 33)[38]. By the way, such a concurrent pattern of explanation re-emerges quite early in commentarial practice since Patañjali already uses the feature of headedness to classify compounds: *avyayībhāva* compounds have the meaning of the first word as principal, *tatpuruṣa* compounds have the meaning of the last word as principal, *bahuvrīhi* has the meaning of another word [than the constituent members] as principal, dvandva have the meaning of both words as principal[39].

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[38]   Patañjali (M 2.205 l. 21 ad Vt. 3 ad A 4.1.14) explicitly states that "the technical term *upasarjana* is adopted in place of [the technical term] *a-pradhāna* that occurred in previous grammatical *sūtra*-works".

[39]   M 1.382 ll. 9-10 ad A 2.1.29.

It is thus now important to understand the motives that conditioned this choice made by Pāṇini in the broader context of his analysis of compounds. Compounding, in Pāṇini's grammar is a morpho-syntactic phenomenon involving inflected words (i.e. *pada*s)[40] whose endings are zero-replaced by rule (21) in order to create a compounded stem that receives new endings and alternates in usage and meaning with the analytical expression.

(21) [*luk* 58] *supo dhātuprātipadikayoḥ* (A 2.4.71)
"A case-ending which occurs as a part of a verbal base or of a nominal stem is zero-replaced by *luk*" (whatever the nominal stem)[41]

This last acts as a constituent analysis of the compounded form. For instance, (21a) alternates with two possible analytical constructs (21b,c):

(21a) *yuddha-kuśalaḥ*
battle.STEM + talented.STEM
"talented in fighting (STEM + -*s*.NOM.SG)"
(21b) *yuddhe*   *kuśalaḥ*
in battle/war.LOC.SG   talented.NOM.SG
(21c) *yuddheṣu*   *kuśalaḥ*
in battles.LOC.PL   talented.NOM.SG

Therefore, and this is another important peculiarity of Pāṇini's description of compounds, stem status is not attributed to any of the compound members. The case-endings of both the constituents are equally zeroed[42] in the same way in both exocentric and in endocentric compounds, irrespective of the fact that in endocentric compounds one of the members is the head of the compound.

[40] More precisely nominal inflected words, technically called sUP, as taught by A 2.1.4.
[41] With the exception of compounds such as *kaṇṭhe-kāla-* in the *throat*.LOC + *black*.STEM → "black-throated" taught in section A 6.3.1-24, which can be assimilated to the Latin type *terrae-motus*, where *terrae* is not a stem but an inflected word in the genitive exactly as *kaṇṭhe* is an inflected word in the locative.
[42] The compounding pattern is described in Lowe (2015: 91) as a mechanism consisting in adjoining non-projecting words (represented as X^) to inflected words (represented as X°). A non-projecting word is a word which does not head phrases (i.e. «it is not possible for another phrase to stand in a specifier, complement, or adjunct relation to such a word»), a concept which could perhaps fruitfully be compared with the mentioned feature of 'having a frozen syntactic relation with the other constituent' as taught for the *upasarjana* by A 1.2.44 (see above, § 3.1). By contrast, the postulation of an inflected word (as an input constituent) exclusively limited to the final constituent (instead of being extended to both the constituents) is quite far from Pāṇini's description.

Case-ending of the *upasarjana*	Example	Translation	The relevant *upasarjana*
II (accusative)	*grāma-gata-*	"who has gone to the village"	*grāmam*
III (instrumental)	*asikalaha-*	"a contest [fought] by means of swords"	*asibhiḥ / asibhyām*
IV (dative)	*yūpadāru-*	"wood [used] for the sacrificial post"	*yūpāya*
V (ablative)	*vṛkabhaya-*	"fear of wolves"	*vṛkebhyaḥ*
VI (genitive)	*rājapuruṣa-*	"king's man, royal servant"	*rājñaḥ*
VII (locative)	*yuddhakuśala-*	"talented in war/battles"	*yuddhe / yuddheṣu*

Table 2. *Frozen case in first position.*

Case-ending of the *upasarjana*	Example	Translation
II (accusative)	*prāptodaka-*	"[the village] which water reached"
III (instrumental)	*ūḍharatha-*	"[the ox] by which the chariot is drawn"
IV (dative)	*upahṛtapaśu-*	"[God Rudra] to whom an animal victim is brought"
V (ablative)	*uddhṛtaudana-*	"[the pan] from which rice is taken away/drawn out"
VI (genitive)	*citragu-*	"[Devadatta] whose cows are bright-coloured"
VII (locative)	*vīrapuruṣaka-*	"[a village] in which there are brave men"

Table 3. *Frozen syntactic relation of bahuvrīhis.*

Beside this syntactic constituent analysis, Pāṇini puts the already discussed analysis in terms of non-headedness (see above, §§ 3 and 3.1), which identifies as *upasarjana*:

a. the constituent taught in the nominative
b. which generally occupies the first position in a compound and that which, when it does not, is in any case recognizable by the fact of having a frozen syntactic relation with the second constituent.

The above mentioned *yuddhakuśala-* is thus accounted for by the rule (22):

(22) *saptamī*   *śauṇḍaiḥ* (A 2.1.40)
      a locative ending.NOM   with 'capable' and so on.INSTR
      "[A word] ending in the locative [combines] with words expressing capacity."

By making use of the analytical frame X NOM. + X INSTR. this rule teaches how to form compounds with the *upasarjana* as first member whose frozen relationship with the second member (restricted by a list of terms meaning capacity) is expressed in the locative. As is shown by the list of classic examples[43] in the preceeding table (Table 2), all the possible case endings and the triplets denoting the grammatical number can apply to the *upasarjana* in the constituent analysis of the compound under analysis.

To these traditional examples we must add the well-known case of co-referent compounds, a sub-class of *tatpuruṣa* compounds with a relation that cannot be described through any other morpho-syntactic marker but the agreement of case, which can by default be envisioned as a combination of two words inflected in the nominative case:

(23a) *mahābhāṣyam*.N
       "great commentary"
       alternating with "a commentary (*bhāṣyam*.N) which is great (*mahat*.ADJ.N)"
(23b) *latāmaṇḍapaḥ*.M
       "a creeper-bower"
       alternating with "a bower (*maṇḍapaḥ*.M) which is a creeper (*latā*.F)"

4.1. Upasarjana *as a key device to understand* bahuvrīhi

Such an analysis of compounds, focused on the non-head constituent, concentrates on a feature shared by both the endocentric and the exocentric

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[43] KV on A 2.1.24; 31; 36; 37; 40; 2.2.8.

compounds. Pāṇini finds the point of difference between the two in the fact that the feature of being *upasarjana* is all encompassing when we come to *bahuvrīhi* (i.e. prototypically exocentric) compounds. All the constituents of this kind of compound indeed are *upasarjana*s, as is taught in the general rule:

(24) *anekam*   *anyapadārthe* (A 2.2.24)
      more than one.NOM   in another word-meaning.LOC
      "Two or more inflected words optionally combine in the meaning of another inflected word (i.e., the meaning of an inflected word different from the constituents)."[44]

Since *anekam* is inflected in the nominative case, once again, on the basis of A 1.2.43 we know that it has to be classified as an *upasarjana*; thus all the members of such compound are its *upasarjana*s and consequently the head is obviously not included in the word-forms of the exocentric compound. As we can see in the preceeding table – a classic list of *bahuvrīhi* examples – in the constituent analysis, we have to suppose a specific fixed case and number ending to explain the relation between the whole combination of the non-head constituents and the head, which is outside the compound (Table 3).

For instance, in the example in the second line (25a), the frozen syntactic relationship between the whole compound *upasarjana* and the relevant word outside (in modern terms, the head outside) is expressed by the instrumental case as is evident also from the traditional analysis of constituents (25b):

(25a) *ūḍha-ratha-*
      driven.STEM–chariot.STEM
      "[The ox] by which the chariot is drawn."
(25b) *ūḍho*   *ratho*   *yena*   *saḥ*
      drawn.PPP.NOM   chariot.NOM   by whom.PRON.INSTR   this.PRON.NOM
      ūḍharatho   [*anadvān*]
      by which the chariot is drawn.NOM   [ox.NOM]
      "This by whom a chariot is drawn is the 'chariot drawing' [ox]."

In this traditional list, it happens that the relationships between the members inside the *bahuvrīhi* compound is always one of co-reference

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[44] The previous rule A 2.2.23 *śeṣo bahuvrīhiḥ* teaches the technical term *bahuvrīhi* for all the compounds included in the remainder of the section.

(*samānādhikarāṇya*), in other words the lexical material upon which the *bahuvrīhi* compound is constructed is a *karmadhāraya*. This is certainly a common and productive pattern, but nevertheless other examples of *bahuvrīhi* also exist (and commentators are aware of them) whose internal analysis highlights a subordinative construction:

(26a) *asi-pāṇi-* "one who has a sword in his hand"
(26b) *putra-kāma-* "desiring sons"[45]

Thus, since the non-head is always included in the linguistic material of compounds, be they endocentric or exocentric, this kind of analysis actually re-establishes equal opportunities for both types, instead of relegating the exocentric ones to a marginal and irregular class of compounds with respect to the supposed prototypical endocentric compound. There is no need to teach any dedicated rule to assure the right derivation of the exocentric compound stems, as far as the morphological features of their single constituents are concerned. It is actually a broadly applied general rule, namely A 2.4.71 (see § 4) which teaches a zero-replacement of any case-ending, whenever this case-ending occurs as a part of a verbal or nominal base.

And the substitution of a long vowel with the matching short one, i.e. the process of getting rid of the feminine mark of the constituents is taught by the above-mentioned A 1.2.48 (see § 3.1) a rule valid not only for all classes of compounds but also for all secondary derivational nominal stems.

(27a) *nis-* + *kauśāmbī*   →   *niṣkauśāmbi-ḥ*.NOUN.M
(27b) *maitri-*.M.SG [metronymic name of a teacher]
       "the son of *maitrī-*.F. SG"

One last important point deserves our attention: the all-encompassing subordination of constituents, that characterizes the exocentric compounds arises independently of the syntactico-semantic relation between the constituents. This is accounted for by Pāṇini in his mention of *anekam* in A 2.2.24 where no specific relation between the constituents is identified. We can see

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[45] As GILLON (2007: 2) points out at the beginning of his paper dedicated to exocentric compounds in English and Sanskrit, later tradition – departing from a strictly Pāṇinian procedure – classifies the *bahuvrīhi* compounds in several sub-categories following the internal analysis of the members: privative (*nañ-bahuvrīhi*), comitative (*saha-bahuvrīhi*), prepositional (*prādi-bahuvrīhi*), homodenotative (*samānādhikaraṇa-bahuvrīhi*) and heterodenotative (*vyadhikaraṇa-bahuvrīhi*) compounds. Unfortunately, in his article, he only concentrates on what he calls the "homodenotative" ones.

how this description works by applying it to *bahuvrīhi* compounds where the relationship between the members is patently subordinative, such as in the already mentioned case of *asipāṇi* "having a sword in his hands" (28a), which works exactly in the same way as *citragu* "having brightly coloured cows" (28b):

		internal analysis	*upasarjana*
(28a)	example		
	asipāṇi	*asiḥ*.NOM *pāṇau*.LOC	*asipāṇi-*
(28b)	example	internal analysis	*upasarjana*
	citragu	*citrāḥ*.NOM *gavaḥ*.NOM	*citragu-*

This provides us with an even stronger argument in favour of a purely morphological definition of *upasarjana* which avoids any semantic implication: an *upasarjana* is simply a word with a fixed relationship with another constituent of the syntagm that governs it, and a whole compound may be classed as *upasarjana* if it shows such a feature.

5. *Comparing theories*

It may be interesting to note that a growing awareness of this possibility of bridging the gap between endocentric and exocentric compounds may be seen in the most recent contributions on compounding. Indeed, Štekauer (1998), in order to just explain exocentric compounds, distinguishes two steps, (even though he considers that only the first has word-formation relevance) i.e.:

1. he describes the operation that we called the postulation of a combination of the inflected words matching the compound, as «the formation of an auxiliary, onomasiologically complete syntagm – with both the base and the mark included»;
2. and then focuses on the so-called 'shortening' of word forms, which in the case of exocentric compounds consists in cancelling the head of the compounds, such as the word *man* in the compound *red-skin* where the auxiliary onomasiologically complete syntagm is *red+skin+man*[46].

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[46] This is a major difference with Pāṇini's model which does not zero-replace the non-*upasarjana* at all even though he makes extensive use of zero devices. This also derives from the fact that Pāṇini extensively employs this possibility of a stem (any stem) acting as an *upasarjana* with reference to other words and does not limit it to specific world-classes, such as adjectives or *bahuvrīhi* compounds.

Nonetheless, the head (= non-*upasarjana)* constituent (i.e. that which identifies the denoted object) in the exocentric compound is not zero-replaced at all in Pāṇini's grammar: the possibility for any word to have a referent other than its own is accepted by Pāṇini even for non complex formations such as the substantivized adjective. None of these phenomena is accounted for with zero-replacement as zero is specifically reserved to account for variation.

Again, in accordance with Pāṇini's model, modern scholarship is becoming increasingly aware of the fact the distinction between endocentric and exocentric constructs does not involve the internal relationship between the constituents. Both a subordinate and an appositive/attributive compound can be endocentric as well as exocentric, as is shown in Scalise-Bisetto's recent (2012) classificatory model with three classes of compounds[47]:

SUBORDINATE	endocentric: ex. *steamboat*
	exocentric: ex. *loudmouth*
ATTRIBUTIVE / APPOSITIVE	endocentric: ex. *snail mail*
	exocentric: ex. *green-eyed*
COORDINATE	endocentric: ex. *girl-friend*
	exocentric: ex. *mother-child*

Furthermore, if we take into account the identification or specification schema = *determinatum/determinans* relation, which, for instance, Kastovsky emphasized in 1982 (he considered the exocentric compound as a deviating formation), we could reflect on the *upasarjana*-based model to realize how Pāṇini somehow selected the most durable linguistic material.

In fact, the identifying role of lexemes (i.e. its capacity to signify the *determinatum*) seems to be less important and almost unnecessary in several classes of word-formation[48]. See for instance the series of formations generated when a secondary derivational nominal stem is taught as equivalent to a compound or a syntagm:

(29) *upagoḥ*.GEN *putraḥ*.NOM
    "Upagu's son", alternating with *upagu-putra-/aupagava-* (A 4.1.92)

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[47] This model is also adopted by LIEBER (2010: 140); cf. LIEBER (2012: 87).

[48] By the way, this seems to find some support not only from a linguistic perspective but also from a cognitivist one. We make reference here to a crucial study by HAMPTON (1987) where the author illustrated some experiments on the effects of the dominance of attributes in concept conjunctions, showing, among other things that «greater weight is given to a concept for predicting typicality in a conjunction when the concept occupies the qualifier position than when it is head noun position in a conjunctive phrase» (HAMPTON, 1987: 63). See above, § 2.4.

On the one hand, the gradual disappearance of the linguistic material which conveys the sense of *putra-* is self-evident, even though the son is indeed identified, while, on the other, the function of the specification is indispensable. The name of *upagu-*, i.e. the *upasarjana* has to be compulsorily mentioned, i.e. included in the relevant formation.

To sum up: in an *upasarjana*-relation, in the easier endocentric schema, the two stems have a fundamental influence on each other – a specific kind of influence which can be explained as a case-relation – which is commonly conveyed by some inflection marks or by the grammatical agreement. From the syntactic point of view, one stem blocks the function of the other stem (i.e. the *upasarjana*) with which it combines, but if we concentrate on the plastic representation of the meaning, we could say that it releases the *upasarjana*, which somehow stops working as a dependent inflected word (subordinate in a hierarchic sense) and starts being preponderant in the imagery of speaker and listeners: it really depends on the action of pouring something upon (*upasṛj-*) the head and of colouring it. Its specifying function with all its lexical and figural preponderance prevails over the identifying role of the stem with which it combines (cf. Marchand, 1960 and Kastovsky, 1982 categories). This is why, among the classical parameters adopted for identifying the head of a syntactic construct, perhaps the most evidently misleading parameter could be «the head is an obligatory constituent in the phrase»[49].

On the other hand, the frozen syntactic relation, holding between the upasarjana and the other constituent of a compound, described by Pāṇini and – within thoroughly different descriptive patterns of compounding – by modern contributions[50] clearly accounts for the ambiguous status of the compounding mechanism, which is definitely intermediate between syntax and morphology. In fact Pāṇini's technical opportunity for a morpheme of preserving the syntactic relation with its head conveyed by the zeroed inflectional markers may be an effective device to account for lexical subordination in a number of morphological processes such as compounding[51].

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[49]   See e.g. BAUER (2004, [1990]: 172).

[50]   See e.g. both the «non-projecting category» also used to describe the constituent labelled as *upasarjana-* by Pāṇini in LOWE (2015: 88-94) – cf. above, n. 46 – and the proposal «to integrate morphological structures into the hierarchical analysis and to identify the head, not by applying the criterion of category consistency, but by defining the syntactic relation with its complement» in BAUER (2014: 19).

[51]   Significantly a comparable frame is applied by Pāṇini to describe secondary derivation.

List of Abbreviations

ABL = ablative   NOM = nominative
ACC = accusative   M = masculine
ADJ = adjective   PL = plural
ADV = adverb   PPP = passive past participle
F = feminine   PREV = preverb
GEN = genitive   PRON = pronoun
INSTR = instrumental   SG = singular
LOC = locative   VB.ADJ = verbal adjective
N = neuter

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