

AGAINST A CONTEXTUAL DEFINITION OF HEAD IN MORPHOLOGY:  
EVIDENCE FROM MODERN GREEK COMPOUNDS<sup>1</sup>

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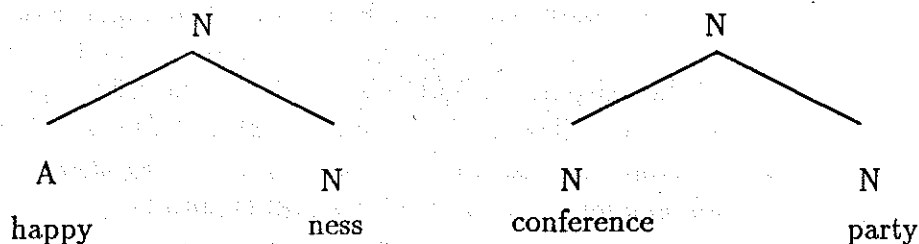
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## 1 The Problem

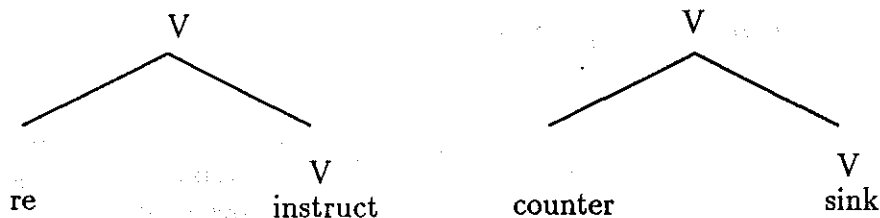
Like syntactic structures, word structures tend to be headed. This tendency has been explored by various proposals (Lieber 1981, Williams 1981, Selkirk 1982, Di Sciullo and Williams 1987) which attempt to define the notion "head of a word" in morphology.

It is generally the case that a suffix or a righthand element in a compound determines the category of the word to which it attaches to while a prefix does not. Contrast (1a) with (1b):

(1a)



(1b)



The generalization made from (1) is that all English words are right headed. This empirical observation has been theoretically pursued in the morphological theory of Di Sciullo and Williams (1987) where the place and function of derivation and compounding are treated in the same way. Moreover their principles

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of word formation are meant to be universal and any exceptions to the right-headedness rule are treated as marked 'non-morphological' objects generated by 'non-morphological' rules which belong to all languages. In essence such a definition exploits the availability of a contextual means (i.e. linear order of constituents in the word) for defining the notion "head of a word" as was initially proposed in Williams' Righthand Head Rule (Williams 1981, Di Sciullo and Williams 1987:19). The primary purpose of this article is to show that any definition of head which uses such contextual means is untenable, based on evidence from the Modern Greek compounding system. As a corollary, one cannot associate at least synchronically the direction of headedness in compounds with that of derivation.

Restricting our attention only to compounds we find that in different languages heads appear in different positions. In Romance languages heads of endocentric compounds appear typically to the left. In Germanic languages heads appear typically to the right. Given the current emphasis on language parametrization in generative studies one is tempted to ask if we can fix the position of the head in at least the compounding structures of a particular language. We claim that Modern Greek allows for the creation of both right and left headed compounds and thus fixing the position of head is untenable in at least one particular language. The position of head may be subject to a generalization but one that cannot be elevated as a general principle of all languages as posited in Williams' RHR or its later revisions.

Our evidence correlates with data from other languages given initially in Zwicky (1985), Anderson (1992), and Scalise (1988). Aronoff (1988) also cites Nhan (1982) for the existence of both left and right headed compounds in Vietnamese. Furthermore, following Anderson (1992) and Zwicky (1985), one can account for the compounds in Modern Greek by accepting that headedness is a property of rules, similar to those of Selkirk (1982), and not a property inherent to a fixed constituent. The nature of these rules is essentially syntactic.

## 2 Contextual Definitions

In syntax, the X-bar rule schema  $X^n \rightarrow \dots X^{n-1} \dots$  specifies that the rules of syntactic structure must conform to an 'endocentric requirement'. Each phrase must contain a lexical head with the intrinsic property of being one bar-level lower than the phrase itself. The categorial means of identifying the head of a phrase then is that it is the only daughter of the phrase that is not a maximal projection.

In morphology such an identification of the head is not possible since we have no system of structural description that could impose a linear order on the constituents of the word<sup>2</sup>. In *conference party* both constituents are nouns or  $X^0$ s and the compound is an  $X^0$ . There is however the trivial order imposed by the position of the constituents in a word and all proposals exploit this

<sup>2</sup>Of course Selkirk (1982) proposes an X-bar theoretic notion of word formation but her system is not generally accepted, and also not universal (her definition of head is specified as being particular for English).

contextual means (Di Sciullo and Williams 1987:19,26) in defining the notion of head in morphology. Let us therefore call a definition of head in morphology a "contextual definition" iff:

- (2a) it assumes that the property is independently motivated and inherent to a fixed constituent, and
- (2b) it identifies the head constituent by its *position in the linear order* of the word internal configuration.

Our term then corresponds to a set of definitions which is a superset of the ones already proposed. Specifically, it includes the following proposals:

- (3a) positional definitions which specify heads to be to the right (Williams 1981), or to the left,
- (3b) the revision of Williams' (1981) definition by Selkirk (1982),
- (3c) definitions based on a relativized notion of head with respect to feature F with a right direction of headedness (Di Sciullo and Williams 1987), or with a left direction of headedness.

Most recent work on heads in morphology is directly or indirectly inspired by Williams' positional definition of head (the well-known RHR) given in (4):

- (4) *Righthand Head Rule, Williams (1981:248)*

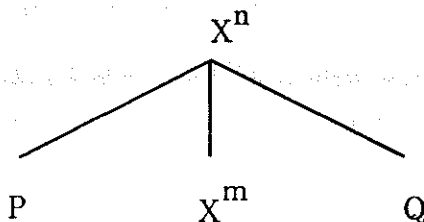
In morphology we define the head of a morphologically complex word to be the right-hand member of that word.

This definition has been falsified by data from several languages (e.g. Tagalog, Vietnamese: Lieber 1980:54-58; 1992). Lieber (1980:55, 1983) accepts Williams' RHR but her theory employs other percolation mechanisms to allow for feature percolation from lefthand constituents.<sup>3</sup>

A modified version of this definition is given in Selkirk (1982) where she posits an X-bar theoretic notion of head. The head is then identified as in (5):

- (5) *The Right-hand Head Rule (revised), Selkirk (1982:20)*

In a word-internal configuration,



<sup>3</sup>Lieber (1983) posits a set of feature percolation conventions which are crucial in her account of compounds. Sproat (1985) argues against these conventions and shows that they fail to account for nominalizations like *the destruction of the city*. We will thus not discuss her proposal here.

$X^n \rightarrow P X^m Q$ , where  $X$  stands for a syntactic feature complex and where  $Q$  contains no category with the feature complex  $X$ ,  $X^m$  is the head of  $X^n$ .

This is equivalent to saying that *every* constituent contains a head. A word constituent  $X^n$  with a given set of features will contain a constituent  $X^m$ , its head, which also bears those features. Here the rightmost category in  $X^n$  with the feature complex  $X$  is distinguished as the head. The rule has been mainly motivated by the productive verb-particle constructions in English which are left-headed (e.g. *look up, sit in, worn out*) and the claim that inflectional affixes (which are on the right in English) are not heads, a position taken by Selkirk on her account of affixation. Selkirk explicitly recognizes the fact that the revised RHR is a definition which is particular for English and that Vietnamese or French have left-headed compounds, which she uses to argue against the universal RHR.

Let us now concentrate on the work of Di Sciullo and Williams (1987), which is a thorough treatment of the most basic issues in the theory of word structure to be found in the current literature (see Baker (1988) for a general appraisal of this work). A fundamental position taken in this work is that there is no principled difference in the place or the function of inflection, derivation, and compounding in the architecture of the grammar. The morphological component is distinct from syntax, and employs two calculi of word formation. The first derives the features of a derived word by use of the definition of head and the other deals with the calculation of argument structure of derived words in terms of the argument structures of the parts. Both will be discussed in section 4.

Di Sciullo and Williams account for left-headed words by relativizing the notion of head with respect to a feature  $F$ . Their definition is as follows:

(6) *Di Sciullo and Williams (1987)*

The  $head_F$  (read: head with respect to the feature  $F$ ) of a word is the rightmost element of the word marked for the feature  $F$ .

As an example consider the Latin word *ama-bi-tur* 'will be loved'. The semantic head will be *ama*, the affix *bi* is the  $head_{future}$ , and the affix *tur* is the  $head_{passive}$ .

We consider at this point the proposed definitions in the more general context in which they were posited before concentrating on the main part of this article. All works are motivated by the existence of the Percolation principle. The principle ensures the well-formedness of a syntactic structure by requiring that a constituent and its head have the same feature complex (Williams 1981) and is given in (7):

(7) *Percolation (Head Feature Convention)*

If a constituent  $\alpha$  is the head of a constituent  $\beta$ ,  $\alpha$  and  $\beta$  are associated with an identical set of features (syntactic and diacritic).<sup>4</sup>

<sup>4</sup>According to Selkirk (1982) the syntactic category features are [+/- Noun], [+/- Verb].

With syntactic Percolation there are usually two associated notions:

- (8a) There is a head and it is unique.
- (8b) Feature propagation paths originate only from heads.

Any attempt to borrow this notion of head into morphology has resulted in a relaxation of (8a) or (8b). To see this consider the issue of multiple inflection in (9):

- (9) *Multiple Inflection*  
 Inflectional affixes may lie in topologically different morphemes which are responsible for the percolation of their diacritic features. As Scalise (1988) notes in Italian and German the tense morphemes *v* and *te* occur before the person and number morphemes *i* and *st* in:  
 Italian:     ama - v - i     'you loved'  
 German:    lieb - te - st

This fact has received two fundamentally different interpretations for the theories discussed here. Selkirk (1982:75) considers it as the main argument against construing inflectional affixes as being heads. This position is directly justified since the syntactic notion of Percolation assumes a unique head. To account then for multiple inflection she posits a generalization of the percolation principle to allow for feature propagation paths which originate from non-heads thus relaxing requirement (8b).

On the other hand, Di Sciullo and Williams choose inflectional affixes to be heads (unfortunately without a discussion on the issue, see Aronoff (1988:768)). In this work it is taken as an uncontested requirement for the purposes of Percolation in morphology that only features of 'heads' percolate up and features of 'non-heads' are not percolated. They therefore respect requirement (8b) and relax requirement (8a). In both approaches the claimed parallelism between syntactic and morphological Percolation is compromised.

However, it should be pointed out that there is an obvious justification for Di Sciullo and Williams' choice of affixes being heads. Then a uniform account for all morphologically complex words will emerge. The direction of headedness is set once 'to the right' for inflection, derivation and compounding. It will become clear as a corollary of the main part of this article that relating the direction of headedness in compounding and derivation is untenable.

### 3 Types of Modern Greek Compounds

Modern Greek has an informative system of compounding in many respects.<sup>5</sup> As Triandaphyllides (1941) notes, in the Modern Greek compounding system

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All others are diacritic features. Selkirk also assumes that strict subcategorization features do not percolate. Percolation of subcategorization information is central for the account of compounds in Lieber (1983) and Di Sciullo and Williams (1987), and is naturally assumed in other works on compounds also, see for example Li (1990).

<sup>5</sup>Our description in this section draws mainly from Triandaphyllides (1941).

the acceptance of a new compound depends to some extent on the frequency of co-occurrence of the constituent words in a syntactic phrase, and thus the border between phrasal co-occurrence and compounding does not always appear to be clear. The compounding process in Modern Greek is infinitely productive as a whole. New compounds can be created from the needs of the everyday context which have never been heard before. For the compounds to be accepted by the community of people at large they have to correspond to a real need and to satisfy the linguistic intuition.<sup>6</sup>

Following Bauer (1983) the compounds in Modern Greek can be divided into three general classes. The first type of compounds are the compounds given the Sanskrit name *dvandva*, as illustrated in (10):<sup>7</sup>

- (10) *andro-gyno* 'man-wife' = a couple  
*anigo-klino* 'open-close' = to open and close repeatedly  
*mpeno-bgeno* 'enter-exit' = to enter and exit repeatedly  
*rizo-galo* 'rice-milk' = a mixture of rice and milk

In this type it is not always clear which element is the grammatical head or the semantic head. In Bauer's (1983) terms the compound is not a hyponym of either element, but the elements name separate entities which combine to form the entity denoted by the compound.

Modern Greek is also affluent in *bahuvrihi* compounds (also called *exocentric*). In the examples in (11) let ADJ represent the zero adjectivalizing morpheme:

- (11) *kalo-kardos* 'good-heart-ADJ' = having a good heart (good hearted)  
*makri-heris* 'long-hand-ADJ' = having long hands (long-handed)  
*mavro-mallis* 'black-hair-ADJ' = having black hair (black-haired)  
*stogylo-prosopos* 'round-face-ADJ' = having a round face (round-faced)

In this class the compound is not a hyponym of the grammatical head (just as in English *red head* is not a type of *head*). The defining characteristic of the class is that the semantic head is unexpressed. Although the compounds in this class lack a semantic head their semantic pattern is well defined: the first constituent acts as an adjectival modifier of the property denoted by the second constituent and the compound describes the person having the modified property.<sup>8</sup> This class is extremely productive.

**Endocentric** compounds in Modern Greek are characterized by the existence of an element which is the semantic head. The other element can serve two functions in the compound: it acts as a modifying element or as an argument of the semantic head. In either case, the compound is a hyponym of the head. Endocentric compounds of the synthetic type have been extensively studied primarily in English (Roeper and Siegel 1978, Selkirk 1982, Lieber 1983, Sproat

<sup>6</sup>See Downing (1977) and Levi (1978) for two views on the productivity of the compounding process.

<sup>7</sup>These are rare in Ancient Greek as in English and become frequent in the early middle ages in Byzantine Greek. See Browning (1983:67) for comments.

<sup>8</sup>See Bauer (1983:50 and 55) for a discussion here.

1985). They are distinguished from the other endocentric compounds by having a head which is derived from a verb and thus can be argument taking. All of the works treat the relation between left-hand member and the head by analogy to the relation between verbs and their argument structure. Some examples of synthetic compounds follow in (12):

- (12) *anthropo-thisia* 'human-sacrifice' = human sacrifice  
*afto-eleghos* 'self-control' = self control  
*harto-pehtis* 'card-player' = card player (gambler)  
*kapno-paragogi* 'tobacco-production' = tobacco production  
*molivo-ksistis* 'pencil-sharpener' = pencil sharpener  
*prosopo-latria* 'face-worship' = hero worship  
*hrono-metro* 'time-count' = to count the time

#### 4 'Heads' in Modern Greek Compounds

Bauer (1990) notes that it is an ironic conclusion that Williams' Righthand Head Rule, while it appears to have been set up without considering all the relevant factors, probably works about as well as any other generalization would for English. Moreover, Di Sciullo and Williams (1987:26) view their relativization of head in morphology as exploiting the contextual means of defining the head in morphology which was initially posited by Williams with the Righthand Head Rule. Up until now violations of the contextual definition have been treated as marked objects in the theory of Di Sciullo and Williams. Compound-like constructions which do not conform to the definition of headedness are decreed not to be compounds. Since the French constructions which they analyze are strongly phrasal, these words have to be generated by phrase structure rules which belong to the periphery of the grammar. Apart from the issues raised by allowing such marked rules (see next section) what is relevant to our discussion is that Di Sciullo and Williams clearly try to avoid situations where morphological structures can be left and right headed (Di Sciullo and Williams 1987:83) which is exactly the case in the Modern Greek compounding system as we will see below.

Let us assume any contextual definition of head in morphology. Such a definition will associate the determination of a property of the whole with one of its members. Let us denote the head specified by such a definition with *head<sub>C</sub>* (and thus the nonhead with *nonhead<sub>C</sub>*). Assume moreover that the definition specifies the setting of a parameter called the "directionality parameter" in the following way. In the cases where the definition positionally specifies the *head<sub>C</sub>* as being either 'to the right' or 'to the left' the directionality parameter is set correspondingly 'to the right' or 'to the left'. The former is Williams' RHR. The latter would give rise to a contextual definition for languages where heads appear to the left. In the cases where the definition relativizes the notion "head of a word" with respect to a feature F, the directionality parameter can also be set to two values. Setting the parameter 'to the right' gives rise to Di Sciullo and Williams' relativized definition as given in (6), or to Selkirk's (1982)

modification of Williams' RHR as given in (5).<sup>9</sup> Setting the parameter 'to the left' gives rise to a contextual definition along the lines that one could propose by following Selkirk (1982:21) for French and Vietnamese. In any case, the resulting contextual definition of head would apply uniformly to inflection, derivation, and compounding according to Di Sciullo and Williams. Let us furthermore relax this requirement by restricting our attention only to a compounding system, in this discussion, to the compounding system of Modern Greek.

Without loss of generality and to make our illustration more concrete we summarize below the statements of Di Sciullo and Williams which account in their theory for the derivation of the argument structure of compounds. The notion 'head of a word' plays a primary role in these statements.

*Di Sciullo and Williams (1987):*

- (13a) A *nonhead<sub>C</sub>* may but need not satisfy one of the arguments of the *head<sub>C</sub>*.
- (13b) The *nonhead<sub>C</sub>* cannot satisfy the external argument.
- (13c) The arguments of the *nonhead<sub>C</sub>* are not part of the argument structure of the compound.
- (13d) Only the external argument of the *head<sub>C</sub>* is part of the argument structure of the compound.

Claim (13a) is specified as a stipulation where the "argument of" relation can hold between the nonhead and the head as one possible relation that can hold between members of a compound (Di Sciullo and Williams 1987:31). In fact Di Sciullo and Williams posit four kinds of relationships that can hold between the members of a compound. From the examples that follow is evident that the relationship "argument of" can hold in the inverse direction also so that the *head<sub>C</sub>* can be the "argument of" the *nonhead<sub>C</sub>*. This is the case for example in the following synthetic compounds:

- (14a) *katsiko-klephtis* 'goat-stealer' = goat stealer
- (14b) *klephto-kotas* 'stealer-chicken' = chicken stealer
- (14c) *xaso-meris* 'lose-day' = one who wastes his days
- (14d) *meliso-phagos* 'bee-eater' = bee eater (a bird's name)
- (14e) *halaso-horis* 'destruct-village' = one who destroys his village
- (14f) *nomo-thetis* 'law-putter' = one who makes the law

<sup>9</sup>To see the latter notice that Selkirk's definition of head is Di Sciullo and Williams' definition in which there is only one head. As pointed out earlier Selkirk recognizes a unique head in each word internal configuration.



In (14a) and (14b) both constituents are of the same category. The relativized definition predicts that if the relevant property is not specified in a constituent, then its value will be determined by the preceding constituent. Thus in (14a), the *nonhead<sub>C</sub> katsik-* will be the argument of the *head<sub>C</sub> klephtis* and the prediction is correct. However, in (14b) the *head<sub>C</sub>* is the argument of the *nonhead<sub>C</sub>* assuming the RHR or a right-headedness relativized rule. But the righthand member of (14b) is not the semantic head since *klephto-kotas* is not a kind of chicken and also it is not the grammatical head since the noun *kota* 'chicken' is feminine but the compound in masculine. In (14a) the *head<sub>C</sub>* would be the argument of the *nonhead<sub>C</sub>* assuming the corresponding left direction rules. Thus, a contextual definition of head being positional (left or right) or relativized (with any direction of headedness) will not work. A similar argument applies to the next two pairs in (14).

More striking evidence is given by the doubly formed class of compounds.<sup>10</sup> Consider the following examples:

(15a) *hiono-nero* 'snow-water' = iced water, and *nero-hiono*

(15b) *philo-zoos* 'fond of-animal' = fond of animals, and *zoo-philos*

(15c) *kardio-htipi* 'heart-beat' = heart beat, and *htipo-kardi*

(15d) *dondo-ponos* 'tooth-ache' = tooth ache, and *pono-dondos*

(15e) *lemo-ponos* 'throat-ache' = throat ache, and *pono-lemos*

Again constituents of the same category are involved and the contextual definition of head would fail to account for the first or the second element of each pair of these compounds for any consistent setting of the directionality parameter.<sup>11</sup>

Consider also the constituent *philo-* 'fond of-' (Steriade 1988) which exhibits a similar behavior when appearing in compounds with the other constituent being a Noun or an Adjective. Some examples are given below:

(16a) *phil-anthropos* 'fond of-human' = fond of humans

(16b) *philo-ksenos* 'fond of-foreign' = hospitable

(16c) *philo-musos* 'fond of-music' = music lover

(16d) *philo-doksos* 'fond of-fame' = fond of fame

(16e) *phil-autos* 'fond of-self' = fond of himself

(16f) *philo-sophos* 'fond of-wisdom' = philosopher

<sup>10</sup>Doubly formed compounds occur also in German as noun-noun compounds in the "Kopulative-Komposita" class. See Shin (1982:724) for some examples.

<sup>11</sup>Brian Joseph (in personal communication) suggests that in principle one could analyze compounds like *htipo-kardi* as having a verbal first constituent, *htip-* 'beat' in this example. This analysis does not affect the general point being made here.

However, there there are also the following forms with the order reversed:

- (17a) *alvano-philos* 'albanian-fond of' = fond of albanians
- (17b) *amerikano-philos* 'american-fond of' = fond of americans
- (17c) *germano-philos* 'german-fond of' = fond of germans
- (17d) *irino-philos* 'peace-fond of' = fond of peace
- (17e) *skio-philos* 'shade-fond of' = fond of shade
- (17f) *vivlio-philos* 'book-fond of' = fond of books

In all forms that follow the pattern *phil(o)-X* the *head<sub>C</sub>* is an argument of the *nonhead<sub>C</sub>*.

Now consider the prediction made by claim (13b). This claim is derived from one of the basic assumptions made in the theory. The distinction between external and internal arguments is fundamental. The argument structure as a whole does not pass up the X-bar projection, but the external argument is assumed to be the head of the argument structure and will pass up to become a feature of the maximal projection of the predicate. Then it can be assigned to the subject of the predicate by the rule of predication. It is not clear what is meant by positing the external argument as being the head of the argument structure and whether this notion of head bears any relation to the notion head of a word. In the first member of each pair of compounds in (15) (c), (d), (e) the *nonhead<sub>C</sub>* seems to satisfy the external argument of the *head<sub>C</sub>* while in the second member of each pair the *head<sub>C</sub>* satisfies the external argument of the *nonhead<sub>C</sub>*. Many examples also exist in English where the *nonhead<sub>C</sub>* seems to satisfy the external argument of the *head<sub>C</sub>* (examples taken from Quirk et al 1972): *bee-sting, catcall, daybreak, earthquake, frostbite, headache, heartbeat, landslide, nightfall, rainfall, sound change, staff meeting, toothache*, etc. There also cases where the *head<sub>C</sub>* satisfies the external argument of the *nonhead<sub>C</sub>*: *crybaby, driftwood, drip coffee, flashlight, glowworm, hangman, playboy, popcorn, stinkweed, tugboat, turntable, watchdog*, etc. Members of the productive pattern [verbal noun in -ing + subject] follow the last pattern as well: *dancing girl, cleaning woman*, etc. Other languages also exhibit such examples (see Hoeksema 1987 for some examples from Dutch).

Finally, consider claims (13c) and (13d). These claims follow from Di Sciullo and Williams' assumption that Percolation is a property of *heads<sub>C</sub>* and only *heads<sub>C</sub>*, and that the argument structure as a whole does not percolate but rather that only the external argument of the *head<sub>C</sub>* percolates. The set of examples in (14)-(17) provides counter evidence for these claims. In most of our examples the *nonhead<sub>C</sub>* is the one providing the requirement for an external argument to the whole. For example consider adjectives with *philo-* as a left hand member. The external argument of the compound adjective is inherited from *philo-*. This external argument can for example be satisfied by a subject via predication (see Higginbotham 1985 for the various types of  $\theta$ -role discharge) as depicted in (18):

- (18) o Kostas einai philo-zoos  
 Art Kostas is-3Sg fond+of-animal  
 Kostas is fond of animals

Our next point of focus is another productive compound construction in Modern Greek. It is composed of two nouns. The left hand noun is the determinatum, the righthand noun is the determinant (as in Marchand 1969):<sup>12</sup>

- (19a) *pedi thauma* 'child miracle' a phenomenal kid  
 (19b) *tihv vouno* 'luck mountain' a great luck  
 (19c) *leksi klidi* 'word key' a keyword  
 (19d) *plio fandasma* 'ship ghost' a ghost ship  
 (19e) *anthropos pouli* 'human bird' a human who flies like a bird  
 (19f) *anthropos arahni* 'human spider' spider man  
 (19g) *erotisi pagida* 'question trap' a dangerous/suspicious question

The semantic pattern expressed by this kind of compounds entails a metaphorical relation, where the lefthand member has some featured property of the righthand member. For example, 'anthropos pouli' *human bird* is not a 'human and a bird' but a 'human who resembles a bird in one of its characteristics, for example a human who flies like a bird'. Both nouns in each example are in nominative case. The number, gender, and case of the composite construction is inherited from the left hand noun:<sup>13</sup>

- (20) *nomos plesio* 'law frame' a law that includes general terms which allow for detailed future modification  
*nomous plesio* 'law-GENITIVE+PLURAL frame'

The two nouns are morphologically independent in the sense that all nine possible combinations of pairs of genders appear in the construction. In contrast to compounds like those in (12) in which the combination has one stress, each noun in these compounds retains its stress. These compounds exhibit the same behavior with the types we have seen up to now: The two parts have no independent reference (they are syntactic atoms in Di Sciullo and Williams's sense) and there is a specialization in the meaning of the two components so that the composite has its own independent meaning. Although the two constituents have their own stress it is important here to notice that the construction is morphologically distinct in the sense that the left-hand noun is being modified

<sup>12</sup>Anastadiadi-Simeonidi (1986) claims that these compounds follow a productive pattern which is a loan from French. Most of our examples here are taken from her work.

<sup>13</sup>As Anastadiadi-Simeonidi (1986:204) notes, the two constituents do not necessarily have to agree in gender and number. For example both forms *nomou plesio* 'of law-GEN frame' and *nomou plesiu* 'of law-GEN frame-GEN' are attested.

by a right-hand noun and such a modification is not allowed in the syntax of Modern Greek.<sup>14</sup>

We have, then, a compounding pattern which is clearly left-headed and exists in parallel with the right-headed pattern that produces most synthetic compounds in Modern Greek. There are therefore major difficulties with a contextual definition of head, and although the traditional definition may have a role to play, this role needs to be defined much more carefully and with attention to a wider range of data than has been the case up until now. This is also suggested in Bauer (1990) on the assumption of the contextual definition being Williams' RHR and with the focus on derivational morphology in English. Here we have allowed the contextual definition to take any form by parametrizing either the position of the head in a positional definition or the direction of headedness in a relativized definition.

In short we can draw two conclusions from this section:

- (21a) Concerning the uniform model of morphology proposed in Di Sciullo and Williams (1987), one cannot associate at least synchronically the direction of headedness in derivation with that of compounding (derivational affixes appear to the right in Modern Greek).<sup>15</sup>
- (21b) Contextual definitions of the notion "head of a compound" are untenable. It is certainly not the case that all compounds have a head. For example, dvandva and exocentric compounds do not. Furthermore, a compounding system which has both left and right headed constructions exists for which any contextual definition of head seems to be misguided.

## 5 Conclusion: Compounding Rules

It is clear that the term "compound" has been reserved in the work of Di Sciullo and Williams for the corresponding structures in English:

Essentially we will argue that what have been called compounds in French and Italian are not compounds at all in the sense in which English has compounds but are rather "reanalyzed" phrases. (1987: 79)

That is, Di Sciullo and Williams posit that French words such as *timbres poste* 'postage stamps', *roses thé* 'tea roses', which are apparent counterexamples to their definition of head, are fixed syntactic phrases (idioms):

<sup>14</sup>This is the argument of Marchand (1969:22) for the non-relevance of the stress criterion for compounds of the following type in English: *easy-going, high-born, man-made, German-Russian* where both constituents retain their stress.

<sup>15</sup>For a diachronic approach to the problem see Haspelmath (1992) and for a discussion see footnote 20 in Liberman and Sproat (1992).

... listed phrases such as *timbres-poste* 'postage stamps', [are] cases that Selkirk (1982) analyzes as words (having a morphological structure); but we feel such forms have syntactic structure and in fact are not  $X^0$ s because they are head-initial. (1987: 82)

What this basically says is that  $X^0$ s (classified as compounds by Lieber (1981), Selkirk (1982), and in fact any first order description) which violate the RHR are not compounds. The logic of Di Sciullo and Williams is as follows: words like *timbres-poste* cannot have morphological structure since they do not conform to the fundamental morphological law of headedness. Since in addition morphology is a separate component of the grammar from syntax it has to be posited that these 'non-morphological' objects are formed in syntax. We feel that the reasoning of Di Sciullo and Williams as dictated from their assumptions is at least ill-guided. In particular, we have demonstrated that having morphological structure is not equivalent to being right-headed since there are compounds in Modern Greek which are not right-headed. The patterns of composites in (16) to (19) have morphological structure (they are morphologically distinct in the sense of Marchand (1969)) and are productive, and thus cannot be listed phrases.

According to Di Sciullo and Williams 'nonmorphological' objects are words which are syntactically opaque but also are phrases in that the righthand member can be analyzed as an internal argument of the lefthand member. The rule schema they give for creating these objects is as follows:

$$(22) \quad N \rightarrow XP$$

which essentially reanalyzes a phrase as a word and simply allows any syntactic unit to be analyzed as a Noun. These rules, they posit, are part of the grammar of word formation of French, German, English, Italian, and in fact probably all languages (Di Sciullo and Williams 1987:79).

There are many difficulties associated with the introduction of such rules in the grammar. For example Beard (1988) questions the introduction of such rules on the basis of the productivity of the constructs that will be relegated to marked status by such rules. These constructs include productive types of verb-particle compounds (*break up, drop out, stand in*), bahuvrihi compounds (*blueblood, hardhat, heavyweight, loudmouth, paleface, redcap*), French compounds of the type *essuie-glace*, 'windscreen wiper', *essuie-pieds*, 'doormat', *coupe-cigares*, 'cigar-cutter', *coupe-papier*, 'paper-cutter', *rabat-joie*, 'kill-joy', and French phrasal constructions like

- (23) *trompe-l'oeil* 'a deceive-the-eye' = illusion  
*boule-de-neige* 'a ball-of-snow' = guelder rose, snowball effect  
*hors-d'oeuvre* 'an outside-of-work' = digression, hors-d'oeuvre

These constructions have to be included in the same class with syntactic words in the theory of Di Sciullo and Williams. However as Beard (1988) notes, the examples share nothing except their violation of the RHR. Anderson (1992) also points out that all the recursive internal structure of phrases must be available

within French 'compounds' and thus the posited solution leaves unjustified all kinds of things that do not actually occur as words in French.

We would like instead to propose, following Zwicky (1985) and Anderson (1992), that the formation of compounds is performed by a set of compounding rules. Each rule specifies the categories of the constituent words, and the category of the compound. The rule also specifies the head in the compound, in those cases that the rule provides for headed structures. Anderson proposes the following schema for the formation of Noun compounds both of whose members are Nouns:

$$(24) \quad N \rightarrow N N_H \quad \text{or} \quad N \rightarrow N_H N$$

In such a rule schema there is no requirement that the rule should always specify a head or that the position of the head should be fixed positionally for all compounds in the language. Neither should we connect any possible generalization for the direction of headedness in compounds with the direction of headedness in derivation. In addition, the compounding rule should contain a principle of semantic interpretation for the compounds it provides. As an example consider dvandva compounds in Modern Greek. The principle of semantic interpretation here states that the whole is understood as if the constituent words were conjoined. When the two constituents are verbs the semantic interpretation principle must state that the compound action is to be performed repeatedly.

We therefore claim that an homogenous account of compound formation can arise on the assumption that headedness is a property of the rule that forms the compound, and not something necessarily localizable in one of the constituents. We might be able to pick out a constituent in a large class of compounds as the source of morphological determination or the morphological locus<sup>16</sup> but this cannot be done in general. Instead, the possibility of different positions of the head in compounds is the result of different construction principles of the language.

There are still interesting issues that remain unresolved. Essentially a compounding system which allows for the creation of doubly formed compounds must exhibit a certain degree of redundancy in the compounding rules, an undesirable result. The question of why some classes of compounds appear in double form while the rest do not is central in our inquiry. However, we have illustrated that not only is a contextual definition of head untenable as a universal principle but that even a parametrized version of such a definition will not account for the compounding possibilities of one particular language, Modern Greek. As a corollary one should not assume in a model of morphology that the direction of headedness in compounding is associated at least synchronically with the direction of headedness in derivation. We believe that the untenability of the use of contextual means in expressing headedness in morphology opens

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<sup>16</sup>Following Zwicky (1985), a morphological determinant is the constituent that intuitively 'dominates' its co-constituents and so determines the category of the construct; the morphosyntactic locus is the constituent which bears the phonological marks of inflection.

the way to syntactic explanations for the questions we wish to address.<sup>17</sup>

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<sup>17</sup>Such syntactic explanations are attempted in Lieber (1992) and Beard (personal communication) who posit that the order of constituents in compounds reflects the order of adjuncts and heads in syntax.

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