

Headedness in Word Formation and Lexical Semantics: evidence from Italiot and Cypriot

by Marios Andreou

A thesis submitted in fulfilment of
the requirements for the
Degree of Doctor of Philosophy
at the
UNIVERSITY OF PATRAS

School of Humanities and Social Sciences
Department of Philology

May, 2014



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Declaration

This thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

Signature

Abstract

The present thesis aims to sort out some of the confusions associated with head, focusing on headedness in Word Formation and Lexical Semantics. In particular, the purpose of the present thesis is to enquire into the notion head focusing on the following three issues:

- (a) delimitation,
- (b) position, and
- (c) presence and absence of head in morphological configurations.

An overview of the way head has been used in morphology and syntax (Part I), reveals that there are widely divergent views with respect to the definition and properties of this notion. The much perplexed picture which emerges from the application of the various headship criteria to word-formation in Part II, reveals that most of the assumed head-like notions, such as the *subcategorizand*, might very well not be relevant to the head-nonhead asymmetry. The discussion of the results of the application of these criteria argues for a strictly categorial definition of head, in that the head for the purposes of morphology should be identified with the *category determinant*.

As far as headedness in Lexical Semantics is concerned, I argue that the identification of head by the criterion of hyponymy should be reconsidered, for the hyponymy

test fails to identify the head of various arguably headed morphological configurations. In addition, I show that hyponymy is a relation which holds between the pragmatic bodies of two items and not between their grammatical skeletons and argue that the head for the purposes of Lexical Semantics should be identified with the *ontological class determinant*.

The application of the notion head to the creation of semantically complex configurations reveals that non-argument-taking inflection, prefixation, and evaluative morphology should be accounted for by the same mechanism, namely *subordination of functions without co-indexation*. I also argue that morphemes should be classified according to two main criteria: (a) the semantic features which are relevant to each morpheme and (b) the internal organization of the lexical-semantic representation of a morpheme. In this respect, the distinction between prefixes and suffixes which is based on the linear order of morphemes cannot be used as a criterion in Lexical Semantics. Finally, the comparison between the prefix *re-* and the plural suffix *-s* reveals that these two affixes have shared properties (similar skeletal organization and quantificational features) which can only be accounted for under a lexical-semantic approach.

As far as the position of head is concerned, in Part III of the present thesis I focus on system-internal and system-external factors which govern constituent order in morphology with special focus on Greek compounding. More specifically, although Greek compounds are generally right-headed, I present and analyze a number of left-headed compounds from various evolutionary stages of the Greek language and its dialects (with focus on the dialects spoken in Southern Italy). I comment on whether left-headedness in the dialects of Southern Italy could be attributed to the contact of Greek with Italian which exhibits left-headed compounds and present data from previous evolutionary stages of the Greek language which shows that the particular behaviour of these formations should not be attributed to language interference.

The analysis of left-headed compounds reveals that the order of constituents in compounds may not be autonomous from syntax since the head-nonhead linearization inside compounds cannot change without previous change in the head-nonhead order in syntactic constructions. This conclusion allows one to comment on the validity of the *Lexical Integrity Hypothesis* and the idea that the order of elements inside compound words only obeys morphological settings. I also raise the question of whether there are other

non-morphological linearization settings inside compounds (e.g. *temporal iconicity* in co-ordinate compounds).

Finally, in Part IV, I offer a detailed investigation of the presence and absence of head, which cut across the endocentricity and exocentricity distinction. In particular, I present data which militates against recent proposals that exocentricity should be identified with non-compositionality and that it can be split into *morphological*, *semantic*, and *categorial*. In addition, based on the distinction between nominal and adjectival bahuvrihis, I argue that the former should be analyzed via metonymy and that the latter can be better understood if we examine the relation between compounding and derivation. I also tackle the issue of the inconsistency between the structure suggested by the morphophonological properties and the structure suggested by the meaning of exocentric compounds (*bracketing paradoxes*). Finally, I comment on the distinction between de-compounds and exocentric compounds and argue that exocentricity is compounding for the purposes of derivation.

Περίληψη

Η παρούσα διατριβή εξετάζει την έννοια *κεφαλή* (head) στο επίπεδο της Μορφολογίας και της Λεξικής Σημασιολογίας με έμφαση στα εξής τρία ερωτήματα:

(α) ορισμός,

(β) θέση, και

(γ) παρουσία και απουσία κεφαλής σε μορφολογικούς σχηματισμούς.

Όπως δείχνω στο Μέρος 1, στη διεθνή βιβλιογραφία υπάρχουν αποκλίνουσες απόψεις σχετικά με τον ορισμό και τις ιδιότητες της έννοιας κεφαλή. Η κεφαλή ορίζεται συνήθως με ένα πολύ γενικό τρόπο, ο οποίος καθιστά αρκετά δύσκολη την εφαρμογή της έννοιας αυτής στη μορφολογική ανάλυση. Η εφαρμογή των διάφορων κριτηρίων τα οποία έχουν προταθεί σχετικά με την κεφαλή στο Μέρος 2, δείχνει ότι αρκετοί όροι, όπως για παράδειγμα ο *υποκατηγοριοποιητής* (subcategorizand), δεν σχετίζονται με την ασυμμετρία ανάμεσα σε κεφαλή και μη-κεφαλή. Η ανάλυση των αποτελεσμάτων της εφαρμογής των κριτηρίων αυτών δείχνει ότι η κεφαλή σε επίπεδο μορφολογίας πρέπει να ταυτιστεί με τον *κατηγοριακό καθοριστή* (category determinant).

Ένας βασικός στόχος της παρούσας διατριβής είναι και ο ορισμός της κεφαλής σε επίπεδο Λεξικής Σημασιολογίας και η εφαρμογή της έννοιας αυτής στο σχηματισμό σκελετών μέσω της παράθεσης και υπόταξης λειτουργιών (functions). Αναλυτικότερα,

δείχνω ότι η αναγνώριση της κεφαλής με βάση το κριτήριο της υπωνυμίας αντιμετωπίζει αρκετά προβλήματα καθώς η υπωνυμία συσχετίζει τα Πραγματολογικά Σώματα και όχι τους Γραμματικούς Σκελετούς δύο στοιχείων και υποστηρίζω ότι η κεφαλή όσον αφορά στη Λεξική Σημασιολογία, πρέπει να ταυτιστεί με τον *οντολογικό καθοριστή* (ontological class determinant).

Η εφαρμογή της έννοιας κεφαλή στο σχηματισμό σημασιολογικά πολύπλοκων σχηματισμών δείχνει ότι η κλίση, η προθηματοποίηση, και η αξιολογική μορφολογία, οι οποίες δεν φέρουν ορίσματα, πρέπει να αναλυθούν με βάση το μηχανισμό της υπόταξης λειτουργιών χωρίς την προσθήκη ενδείκτη. Επίσης, υποστηρίζω ότι τα μορφήματα μπορούν να κατηγοριοποιηθούν με βάση δύο κύρια κριτήρια: (α) την εσωτερική οργάνωση της λεξικής-σημασιολογικής αναπαράστασης του μορφήματος και (β) τα σημασιολογικά χαρακτηριστικά τα οποία φέρει κάθε μόρφημα. Ως εκ τούτου, η διάκριση ανάμεσα σε προθήματα και επιθήματα, η οποία στηρίζεται στην γραμμική διάταξη των μορφημάτων, δεν μπορεί να χρησιμοποιηθεί ως κριτήριο στη Λεξική Σημασιολογία. Επιπρόσθετα, η σύγκριση ανάμεσα στο επίθημα δήλωσης του πληθυντικού *-s* της αγγλικής και του προθήματος *re-* δείχνει ότι τα δύο αυτά μορφήματα έχουν κοινές ιδιότητες καθώς έχουν παρόμοια οργάνωση σκελετού και φέρουν ποσοδεικτικά χαρακτηριστικά.

Όσον αφορά στη θέση της κεφαλής, στο Μέρος 3 της παρούσας διατριβής μελετάω πιθανούς ενδογλωσσικούς και εξωγλωσσικούς παράγοντες οι οποίοι μπορούν να επηρεάσουν τη διάταξη των μορφημάτων, με έμφαση στην ελληνική σύνθεση. Ειδικότερα, αν και τα ελληνικά σύνθετα είναι κυρίως δεξιόστροφα, παρουσιάζω και αναλύω αρκετούς σχηματισμούς (από προηγούμενες εξελικτικές φάσεις και κυρίως από τις διαλέκτους της Κάτω Ιταλίας) οι οποίοι φέρουν την κεφαλή στα αριστερά. Καταρχάς, εξετάζω το κατά πόσον η ύπαρξη σχηματισμών με αριστερή κεφαλή μπορεί να αποδοθεί σε εξωγλωσσικούς παράγοντες (επαφή με ιταλική γλώσσα) και παρουσιάζω δεδομένα τα οποία καταρρίπτουν την υπόθεση ότι το φαινόμενο αυτό είναι αποτέλεσμα γλωσσικής επαφής.

Η ανάλυση των συνθέτων με αριστερή κεφαλή δείχνει ότι η διάταξη των μορφημάτων στη σύνθεση δεν είναι ανεξάρτητη από τη σύνταξη καθώς αυτή δεν μπορεί να αλλάξει εάν προηγουμένως δεν έχει αλλάξει η διάταξη κεφαλής και μη-κεφαλής στη σύνταξη. Αυτό το συμπέρασμα μας επιτρέπει να μελετήσουμε καλύτερα την *Υπόθεση της Λεξικής Ακεραιότητας* και την υπόθεση ότι η διάταξη των μορφημάτων στα σύνθετα

υπακούει μόνο σε μορφολογικούς παράγοντες. Επιπρόσθετα, παρουσιάζω και άλλους μη-μορφολογικούς παράγοντες όπως η χρονική εικονικότητα (*temporal iconicity*) οι οποίοι καθορίζουν τη διάταξη των συστατικών στο εσωτερικό των συνθέτων.

Καταληκτικά, στο Μέρος 4 παρουσιάζω μία λεπτομερή μελέτη του ζητήματος της παρουσίας και απουσίας κεφαλής το οποίο ορίζει τη διάκριση ανάμεσα σε ενδοκεντρικά και εξωκεντρικά σύνθετα. Αναλυτικότερα, παρουσιάζω δεδομένα τα οποία καταρρίπτουν την άποψη ότι η εξωκεντρικότητα και η έννοια κεφαλή θα μπορούσαν να χωριστούν σε *μορφολογική*, *σημασιολογική*, και *κατηγοριακή*. Επιπρόσθετα, με βάση τη διάκριση ανάμεσα σε ονοματικά και επιθετικά κτητικά σύνθετα, προτείνω ότι τα πρώτα πρέπει να αναλυθούν με βάση την μετωνυμία, ενώ τα τελευταία μπορούν να μελετηθούν καλύτερα μέσω της ανάλυσης της σχέσης παραγωγής και σύνθεσης. Επίσης, ασχολούμαι με το ζήτημα των *δομικών παράδοξων* καθώς οι μορφοφωνολογικές, από τη μια, και οι σημασιολογικές, από την άλλη, ιδιότητες των εξωκεντρικών συνθέτων προτείνουν διαφορετικές δομές. Καταληκτικά, παρουσιάζω το ζήτημα της διάκρισης ανάμεσα σε παρα-σύνθετα (*de-compounds*) και εξωκεντρικά σύνθετα και προτείνω ότι η εξωκεντρικότητα είναι σύνθεση για τους σκοπούς της παραγωγής.

Acknowledgments

I take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this thesis.

First, I would like to thank my committee members, Angela Ralli, Rochelle Lieber, and Brian Joseph for their encouragement and guidance. I would especially like to express my deepest gratitude to Angela Ralli for her constant support. Without her help this thesis would not have materialized.

I would like to thank the research program “Constantin Carathéodory” of the University of Patras for funding my work. I would also like to acknowledge the help of Argiris Archakis, Christina Bassea-Bezantakou, Pier Marco Bertinetto, Franco Fanciullo, Io Manolessou, Christina Manouilidou, Dimitris Papazachariou, Anna Pouradier Duteil-Loizidou, Anna Rousou, and George Xydopoulos. I am also grateful to a number of friends and colleagues: Nikos Koutsoukos, Metin Bağriaçık, Dimitra Melissaropoulou, Christos Papanagiotou, the Cvirani brothers (Leonardo and Edoardo), Marianna Gkiouleka, Vaso Makri, and Maria Giakoumelou. Special thanks go to Takis Chatzipanagiotis.

Finally, I would like to thank my family, my brothers Andreas and Stylianos, my sister Katerina, and especially my parents, Pavlos and Anastasia, for everything they have done for me and my siblings. This thesis is dedicated to them.

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Theognis Elegiacus [Thgn.] vi B.C.

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Theophrastus Philosophus [Thphr.] iv/iii B.C.

Ed. F. Wimmer, Leipzig (T.) 1854-62; *HP, Od., Sign.*, ed. Sir Arthur Hort, London and New York (Loeb) 1916.

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Plato Philosophus [Pl.] v/iv B.C.

Ed. J. Burnet, Oxford (OCT).

R. = *Respublica*

Pollux Grammaticus [Poll.] ii A.D.

Bks. i-v ed. Bethe, Leipzig 1900: complete in W. Dindorf, Leipzig 1824.

Xenophon Historicus [X.] v/iv B.C.

Ed. E. C. Marchant, Oxford (OCT).

Eq. = *de Equitandi ratione*

Zosimus Alchemista [Zos.Alch.] iii/iv A.D.

Ed. M. Berthelot, *Collection des anciens alchimistes grecs*, Paris 1888, p. 107.

Abbreviations

1 first person

A adjective

ACC accusative

Adv adverb

CM compound marker

DAT dative

DET determiner

Dsuf derivational suffix

F feminine

GEN genitive

IC inflection class

IE Indo-European

INFL inflection

LE linking element

M masculine

METAPH metaphor

N noun

NEUT neuter

NOM nominative

PL plural

PROP proprietive

REDUP reduplication

RHR Right-hand Head Rule

S subject

SG singular

SMG Standard Modern Greek

ThV thematic vowel

TR transitivity

V verb

VN verbal noun

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Part I

Introduction

Aims and Structures

1.1 Aims of the thesis

A basic notion in morphological theory and especially in frameworks which attribute internal hierarchical structure to words is the notion *head*. Since the seminal works of Lieber (1980), Williams (1981b), Selkirk (1982), and Di Sciullo and Williams (1987), the syntactic notion *head* has been extended from syntax to morphology. A corollary of this is that words, like syntactic phrases, are considered to have heads and the identification of head in all morphological configurations, derived words, compounds, and inflected forms, has been central to linguistic morphology. This extension, however, has not been without problems and a number of authors have expressed their scepticism regarding the overall use of the notion head (see for instance the work of Bauer, 1990).

In recent years there has been an upsurge of interest in the study of head and related issues, such as the presence and absence of head, and several approaches have been developed (Bauer, 2008b, 2010; Guevara and Scalise, 2009; Scalise et al., 2009; Scalise and Fábregas, 2010; Kageyama, 2010; Arcodia, 2012; Ralli, 2013; Ralli and Andreou, 2012).

As will become clear, the application of the notion head to morphological theory is

highly problematic since head has been used in very different and often confusing ways. As far as semantics is concerned, the head is usually identified by the hyponymy test which renders the hyperonym head of the word. Head in lexical semantics, however, has never been studied in any detail despite the fact that the hyponymy test is not particularly useful for the identification of head in a number of morphological configurations. In addition, our understanding of the head-dependent linearization and the factors–system-internal or system-external–which could affect this linearization, is rather limited.

The present thesis aims to sort out some of the confusions associated with head, focusing on headedness in Word Formation and Lexical Semantics. In particular, the purpose of the present thesis is to enquire into the notion head focusing on the following three issues:

- (a) delimitation,
- (b) position, and
- (c) presence and absence of head in morphological configurations.

The study of the notion head will also allow us to comment on (a) the relation between Morphology and Lexical Semantics and (b) the Morphology-Syntax interface.

Given that each of these issues raises a number of secondary questions, in the present thesis I must narrow discussion to a series of case studies which I consider central to headedness in Word Formation and Lexical Semantics. By way of example, my analysis of the presence and absence of head in Part IV will suggest a particular understanding of the distinction between endocentric and exocentric compounds which raises several secondary questions, such as the relation between compounding and derivation and the issue of *bracketing paradoxes*. In the present thesis, I will only discuss those questions which are closely interrelated with headedness and which can inform the discussion on the notion head.

Given that the present thesis aims to provide a comprehensive study of headedness, data comes from a number of languages and from different evolutionary stages. For example, in order to delimit head, one must take into consideration a number of morphological phenomena, such as compounding, English prefixation, and Greek evaluative suffixation. In addition, the question of position of head necessarily involves the

presentation of data from previous evolutionary stages of the Greek language, such as Ancient Greek.¹

The present thesis, also aims to contribute to the study of Modern Greek dialects. In particular, I focus on data from two peripheral dialects, namely Italiot and Cypriot. Italiot is an of Greek origin dialect spoken in the southern-most edges of Italy and, more specifically, in Calabria and Puglia. The variety spoken in Calabria is called *Bovese*² and the one used in Puglia is found in the relevant literature as *Griko*.³ The second dialect, Cypriot-Greek, is spoken on the island of Cyprus by an approximate number of 800.000 people and also by immigrant communities of Cypriots in the United Kingdom, Australia, and elsewhere.⁴

The analysis of morphological phenomena in these dialects can greatly inform the discussion on headedness. In particular, the analysis of Italiot compounds will allow us to comment on the head-dependent linearization since in this dialect one finds left-headed compounds despite the fact that Greek compounds are generally right-headed. In a similar vein, Cypriot is particularly rich in compounding patterns and, to anticipate later discussion, Cypriot exhibits some of the rarest attested types of compounds, that is, verbal bahuvrihis. The analysis of compounding in Italiot and Cypriot will be largely based on the rigorous descriptive studies of Andreou (2010, 2013), Andreou and Koliopoulou (2012), and Andreou and Ralli (2012).

¹According to Ralli (2013: 274), the Historic period of the Greek language comprises the following evolutionary stages: (a) Ancient Greek (ca. 1,500-300 BC): (i) Mycenaean (ca. 1,400-1,200 BC), (ii) Dark Ages (ca. 1,200-800 BC), (iii) Archaic (ca. 800-500 BC), (iv) Classical (ca. 500-300 BC), (b) Koine Greek (ca. 300 BC-500 AD): (i) Hellenistic (ca. 300-100 BC), (ii) Imperial/Late Antique (ca. 100 BC-500 AD), (c) Medieval Greek (ca. 500-1,500 AD): (i) Early Medieval (ca. 500-1,100 AD), (ii) Late Medieval (ca. 1,100-1,500 AD), and (d) Modern Greek (ca. 1,500-2,000 AD): (i) Early Modern Greek (ca. 1,500-1,800 AD), (ii) Modern Greek (ca. 1,800-).

²Bovese is also attested with the following names in literature: Greco, Grecanico, and Romaico. It should be noted that Italian scholars often use the term Grecanico (and sometimes Romaico) to refer to both Bovese and Griko. In the present thesis, I will use the term Italiot and not Grecanico to refer to both Greek dialects since for Greek scholars, the term Grecanico is usually used with respect to Bovese only.

³For Italiot see amongst others Morosi (1870), Rohlf (1924, 1950, 1972), Alessio (1953), Profili (1985), Caracausi (1986), Karanastasis (1997), Katsoyannou (1995, 1999), Ledgeway (1998, 2013), Fanciullo (2001), Manolessou (2005) and literature therein.

⁴For Cypriot-Greek the reader is referred to Newton (1972a,b), Arvaniti (1999), Symeonidis (2006) and literature therein.

1.2 Structure of the thesis

The present thesis comprises four parts with two chapters each and a final chapter which summarizes the discussion. The nine chapters are followed by two appendices. Appendix A contains Greek left-headed [N N] compounds and Appendix B presents an overview of the history of the distinction between *endocentric* and *exocentric* compounds. In particular, in Appendix B, I show that (a) this distinction may have Sanskrit origins and that (b) several authors had already used the notion of exocentricity before Bloomfield.

Part I serves as an introduction to the aims and structures of the present thesis (Chapter 1) and to the issues that will concern us in this work.

In Chapter 2, I broadly set out the background and motivation for the current investigation. An overview of the way head has been used in morphology and syntax, reveals that there are widely divergent views with respect to the definition and properties of head. The presentation of various definitions of head in Section 2.1, shows that this lack of agreement partly stems from the fact that head is usually defined in such a broad way that the application of this notion to morphological analysis is rendered highly problematic. For most scholars, for example, the notion head captures the intuition that in a configuration comprising two elements, one of the elements is considered more important than the other, but this is of course a broad description rather than a definition of head. In addition, no consensus has been reached with respect to the properties of head and head has been used as a notion which unifies a number of other notions, including amongst others the *subcategorizand* and the *morphosyntactic locus*. Finally, in this chapter, I also aim to provide a brief overview of the emergence and development of the notion head by presenting some of the treatments that established it in morphological theory (Lieber, 1980, 1992; Williams, 1981b; Selkirk, 1982; Di Sciullo and Williams, 1987).

In Part II, I address the question of delimitation and definition of head.

In Chapter 3, I comment on the delimitation of the notion head in morphology with focus on derivation and compounding. In order to do so, I first present the criteria used in the relevant literature with respect to the identification of head (Section 3.1) and I then apply these criteria to derivation (Section 3.2) and compounding (Section

3.3), respectively. The much perplexed picture which emerges from the application of the various headship criteria to word-formation reveals that most of the assumed head-like notions, such as the *subcategorizand*, might very well not be relevant to the head-nonhead asymmetry. The discussion of the results of the various headship criteria argues for a strictly categorial definition of head, in that the head for the purposes of morphology should be identified with the *category determinant*.

The purpose of Chapter 4 is to investigate the way the head-nonhead asymmetry should be accounted for in Lexical Semantics. In order to do so I adopt the framework of Lexical Semantics as developed by Lieber (2004). In more detail, the purpose of Chapter 4 is to delimit the notion head in Lexical Semantics and to apply it to the creation of skeletons by concatenation and subordination of functions. In this chapter, I argue that the head for the purposes of Lexical Semantics should be a matter of the skeletal features of a morpheme and, more specifically, the head should be identified with the *ontological class determinant*. In addition, the application of the notion head to the creation of semantically complex configurations reveals that non-argument-taking inflection, prefixation, and evaluative morphology should be accounted for by the same mechanism, namely *subordination of functions without co-indexation*.

In this chapter, I also argue that morphemes should be classified according to two main criteria: (a) the semantic features which are relevant to each morpheme and (b) the internal organization of the lexical-semantic representation of a morpheme. In this respect, the distinction between prefixes and suffixes which is based on the linear order of morphemes cannot be used as a criterion in Lexical Semantics. Finally, the comparison between the prefix *re-* and the plural suffix *-s* reveals that these two affixes have shared properties (similar skeletal organization and quantificational features) which can only be accounted for under a lexical-semantic approach.

Although head was introduced into morphology in the early 80's, there is very little in the literature to date that deals with the issue of the head-nonhead order in words. Part III aims to present system-external (Chapter 5) and system-internal (Chapter 6) factors which govern constituent order in morphology with special focus on Greek compounding.

More specifically, although Greek compounds are generally right-headed, in Chapter 5, I present and analyze a number of left-headed compounds from various evolu-

tionary stages of the Greek language and its dialects (with focus on the dialects spoken in Southern Italy). First, I comment on whether left-headedness in the dialects of Southern Italy could be attributed to the contact of Greek with Italian which exhibits left-headed compounds and I then present data from previous evolutionary stages of the Greek language which shows that the particular behaviour of these formations should not be attributed to language interference.

In Chapter 6, I delve more deeply into system-internal factors which could affect the head-dependent linearization. The analysis of left-headed compounds reveals that the order of constituents in compounds may not be autonomous from syntax since the head-nonhead linearization inside compounds cannot change without previous change in the head-nonhead order in syntactic constructions. This conclusion allows one to comment on the validity of the *Lexical Integrity Hypothesis* and the idea that the order of elements inside compound words only obeys morphological settings.

The presence or absence of head cuts across the endocentricity and exocentricity distinction but in order to beg the question *The presence or absence of which head?* Part IV aims to offer a detailed investigation of a phenomenon which, in my opinion, partly reflects the problematic way scholars have treated the notion head.

Chapter 7 serves as an introduction to the distinction between *endocentric* and *exocentric* compounds. In this chapter, I critically evaluate literature on this issue and present data which militates against recent proposals that exocentricity and the notion head can be split into *morphological*, *semantic*, and *categorial*. Based on the distinction between nominal and adjectival bahuvrihis, which is often not taken into consideration by scholars, I argue that the former should be analyzed via metonymy and that the latter can be better understood if we examine the relation between compounding and derivation.

In Chapter 8, I focus on the relation between the two word-formation processes, compounding and derivation. In particular, I argue that the head in exocentric compounds is a derivational suffix (overt or zero) and I present evidence in favour of zero-derivation. To adduce an example, Greek verbal bahuvrihis, such as the Cypriot *vari-kart-izo* ‘to have a hard heart, to be sad’, which are the rarest type of bahuvrihi compounds, are built on the basis of the pattern [[stem stem]-Dsuf]. In addition, I tackle the issue of the inconsistency between the structure suggested by the morphophonological

properties and the structure suggested by the meaning of exocentric compounds (*bracketing paradoxes*). Finally, I comment on the distinction between de-compounds and exocentric compounds and argue that exocentricity is compounding for the purposes of derivation.

Chapter 9 summarizes the main proposals and looks forward to possible advances.

1.3 Presentation of data

As far as transliteration conventions are concerned, for data from Ancient, Koine, and Medieval Greek a standard transliteration (romanization) is used. Data from Modern Greek and its dialects will be given in a broad phonological transcription. Examples are followed by glosses which help with understanding the point at issue. In particular, verbal compounds will be given in the first person singular of the present tense and nominal compounds in nominative singular. Inflectional suffixes and other segments which do not appear in compounds, will be included in parentheses. Stress will be indicated when it is relevant to the discussion. By way of example, consider the presentation of the Modern Greek nominal compound *kuklospito* in (1):

- (1) *kukl-o-spit-o* < *kukl(a) spit(i)*
 doll-LE-house-Infl doll house
 ‘doll house’

This example comprises three parts: (a) the first part contains the compound which is given in nominative singular. The compound is followed by the two compound members, namely *kukl(a)* and *spit(i)*, which are also given in nominative singular. Compound members are given in their full word forms since the morphosyntactic features of a Greek compound may differ from the relevant features of its constituents. Observe that inflectional suffixes and other segments which do not appear in compounds, are included in parentheses. (b) The first part is followed by glosses. (c) Finally, the third part contains a translation of the compound.

The way I presented the compound *kuklospito* in (1) gives redundant information. For example, in most studies, a translation is not given when the meaning is fully clear from the gloss. Given that in the present thesis I will present a number of formally distinct formations, redundant information will help with avoiding confusion. Consider

the presentation of the Ancient Greek compound *theoinos* in (2). In this example, I have not included the “redundant” information of the third part (translation) since the meaning seems to be fully clear from the gloss:

(2) *the-oin-os* < *the(os) oin(os)*
god-wine-Infl god wine

Observe that the gloss suggests the meaning ‘wine of god’. The compound *theoinos*, however, is left-headed and denotes ‘the god of wine’. Of importance is that this information is not provided by the gloss. Given that left-headed compounds will be discussed throughout the thesis, “redundant” information will help with avoiding confusions.

Introducing head

The purpose of this chapter is to provide a brief overview of the emergence and development of the notion head in morphology. In Section 2.1, I show that there are widely divergent views with respect to the definition and properties of head. In Section 2.2, I present some of the treatments that established this notion in morphological theory (Lieber, 1980, 1992; Williams, 1981b; Selkirk, 1982; Di Sciullo and Williams, 1987). The presentation (Section 2.2) and comparison (Section 2.2.6) of these works will allow us to comment on the introduction of the notion head from syntax into morphology and to present some of the divergent views on whether all or some constituents are heads.

2.1 Definitions of head

In both syntax and morphology, there are widely divergent views on what is a head and an unambiguous definition of this notion is still lacking. In fact, head is usually defined in such a broad way that the application of this notion to linguistic analysis is rendered problematic. Consider the following definitions:

- (1) a. The intuition to be captured with the notion HEAD is that in certain syntactic constructs one constituent in some sense “characterizes” or “dominates” the

- whole. (Zwicky, 1985: 2)
- b. [...] the element in some construction to which all the other parts of that construction are (in some sense) subordinate. (Hudson, 1987: 109)
- c. The term **head** is generally used to refer to the most important unit in complex linguistic structures. (Plag, 2003: 135)
- d. [...] talking about the head of a word presupposes [...] that the internal arrangement of the units is asymmetrical, in such a way that one of the units –to put it roughly– has more weight or is more important than the others.
(Scalise and Fábregas, 2010: 109)
- e. **head** the element in a construction that determines the properties of that construction (Booij, 2007: 314)
- f. **head** – element within a compound or derived word that determines the syntactic status, or word class, of the whole word. Semantically, also, a compound noun whose head is X usually denotes a type of X. For example, *house* is the head of the compound *greenhouse*. Many linguists would also analyse some derivational affixes as heads, e.g. *-er* as the head of the noun *teacher*.
(Carstairs-McCarthy, 2002: 143)
- g. head: The morpheme that determines the category and semantic type of the word or phrase. (Lieber, 2010a: 200)
- h. **head** A word in a syntactic construction or a morpheme in a morphological one that determines the grammatical function or meaning of the construction as a whole. For example, *house* is the head of the noun phrase *the red house*, and *read* is the head of the word *unreadable*.
(Aronoff and Fudeman, 2011: 264)

The first four definitions suggest a particular understanding of head, according to which this notion is defined in an asymmetric way. That is, the head is the most important element of a structure and it dominates the whole. In addition, all definitions of head in (1) qualify one and not two or more elements as the head of a structure. These two

observations combined account for the distinction between the notions *head* and *non-head*. Therefore, in a structure comprising two elements, one element qualifies as the head and the other as the non-head, in accordance with the asymmetric way head is defined.

Another issue relates to which criteria should be used in order to define head. For example, as we will see in the next sections, these criteria could be, among others, strictly positional or grammatical. In the former case the head is identified by virtue of being on the left- or on the right-most side of a structure and, in the latter, the head is the element which determines the morphosyntactic features of the whole.

Booij's (2007) definition informs us that the head is the element which determines the properties of the whole, but this raises the question of which and how many these properties are. The definitions of Lieber (2010a) and Carstairs-McCarthy (2002) answer this question by focusing on the categorial and semantic properties of the whole, in that the head is the constituent which determines the syntactic category and the semantic type the formation belongs to. Carstairs-McCarthy's definition, nevertheless, employs the semantic criterion as a rather complementary criterion. Aronoff and Fudeman's (2011) definition dictates that the head is the element which determines either the grammatical function or the meaning of the whole.

It should be noticed that it is not clear whether there is a difference in the way scholars define head on semantic grounds since it seems that the semantic type of a word and the meaning of a word are not the same. Lieber (2010a) and Carstairs-McCarthy (2002), for example, argue that the head determines the semantic type of the word, whereas for Aronoff and Fudeman (2011), the head is the element which determines the meaning of the whole. Therefore, although Aronoff and Fudeman (2011) argue that *read* is the head of *unreadable*, Lieber's and Carstairs-McCarthy's definitions qualify the suffix *-able* as the head of the same word.

Although the semantic and categorial criteria figure prominently in the discussion on head, several authors have proposed that the head can be identified with other notions as well such as the *subcategorizand*, the *governor*, the *distributional equivalent* of the whole, and the *morphosyntactic locus*. It seems safe to suggest that this is one of the reasons why so little agreement has been reached with respect to the definition of head. As a result of the problems pertaining to the specific delimitation of the properties of

head, this notion has been called into question by several authors (see relevant discussion in Bauer, 1990 and Štekauer, 2001) and Bauer (1990: 30) went as far as to conclude with respect to English affixation that “Given the things that ‘head’ is supposed to do at the moment, we would not be much worse off without our heads”.

2.2 Symmetric and asymmetric accounts of head

In order to tackle the issue of definition and identification of head, in what follows, I present and compare the symmetric and asymmetric accounts of headedness with focus on the seminal works of Lieber (1980),¹ Williams (1981b), and Selkirk (1982) which established the use of the notion *head* in morphological theory. The presentation of these works will allow us: (a) to comment on the introduction of the notion head from syntax into morphology and, therefore, to enquire into the use of this notion in syntax and morphology and (b) to present some of the divergent views on whether all or some constituents are heads. Consider for example the discussion on whether prefixes and inflectional suffixes are heads.

More specifically, in what follows, I present the introduction of head into morphology by Williams (1981b) with his *Righthand Head Rule* (Section 2.2.1) and the *Revised RHR* of Selkirk (1982) (Section 2.2.2) which was proposed in order to deal with apparent counterexamples to the RHR. In Section 2.2.3, I present the *Percolation Conventions* proposed by Lieber (1980) which account for the computation of morphological structures without the use of the notion head. Sections 2.2.4 and 2.2.5 deal with *Backup Percolation* (Lieber, 1992) and the notion *relativized head* (Di Sciullo and Williams, 1987), respectively. In Section 2.2.6, I compare the symmetric and asymmetric accounts using category-changing and category-maintaining affixation as test-ground. This comparison will allow us to introduce some of the issues which will concern us in this work. Finally, Section 2.3 concludes this chapter.

¹Although Lieber (1980) does not use the term *head*, her percolation conventions derive the same result.

2.2.1 Williams (1981b): The Right-hand Head Rule

Head was firstly introduced into morphology by Williams (1981b: 148) with his *Right-hand Head Rule* that reads as:

- (2) In morphology we define the head of a morphologically complex word to be the righthand member of that word.[...] Call this definition the *Righthand Head Rule* (RHR).

For example, *instruction* and *reinstruct* in (3) are headed by their right-most constituents; the suffix *-ion* and the verb *instruct* respectively.

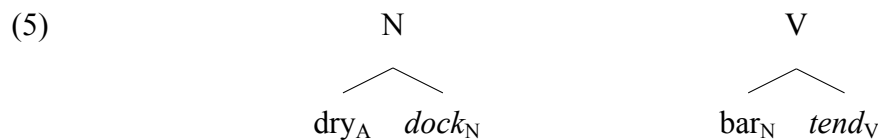
- (3)
- | | |
|--|---|
| $\begin{array}{c} \diagup \quad \diagdown \\ \text{instruct} \quad \text{ion} \end{array}$ | $\begin{array}{c} \diagup \quad \diagdown \\ \text{re} \quad \text{instruct} \end{array}$ |
|--|---|

A corollary of the RHR is that elements on the left-hand side are not heads. With respect to affixation, this generalization yields as a prediction that prefixes, contrary to suffixes, are not heads; prefixes appear on the left-hand side that is predicted to be the non-head position.

- (4)
- | | |
|---|---|
| $\begin{array}{c} \diagup \quad \diagdown \\ X \quad \text{suffix} \end{array}$ | $\begin{array}{c} \diagup \quad \diagdown \\ \text{prefix} \quad X \end{array}$ |
|---|---|

Another difference between prefixes and suffixes is that the latter can be assigned a category since they determine the category of the base that has undergone suffixation. The derivational suffix *-ion*, for example, could be assigned the category N(oun) since it builds nouns as in [[construct]_V ion]_N and [[instruct]_V ion]_N. Prefixes on the other hand do not seem to be able to change the category of the word they attach to. Rather, in prefixation, the element that determines the properties of the whole formation, including its category, is the base-word and not the prefix. For example, *counterrevolution* is a noun, *countersink* is a verb and *counterproductive* is an adjective like their respective right-most elements which act as heads. The conclusion to be drawn then is that *counter-* is category-less and it is not a head.

With respect to compounding, righthandedness is evident in English compounding as *dry dock* and *bar tend* illustrate.



As we see from the examples in (5), in both compounds, the category is determined by the constituent which is on the right-hand side, thus offering arguments in favour of the RHR. For example, *dry dock* which is composed of an adjective, *dry*, and a noun, *dock*, belongs to the category of its head element, *dock*, and not to the category of its leftmost element, which is the non-head. Similarly, *bar tend* is a verb and not a noun since its head is the verb *tend* and not the noun *bar*.

Williams, however, identifies two cases that challenge the RHR. The first counterexample comes from *en-* prefixation. This prefix seems to bear categorial features since it can productively attach to nouns and adjectives in order to create verbs. The prefixed word *enrage*, for example, is a verb and not a noun as its rightmost element, *rage*, is. This nature of *en-*, however, militates against the assumption that the head is rightmost in all words since *en-* could be attributed the category V(erb) and act as a head, in that it can determine the category of the prefixed word. The second challenge for the RHR is the existence of nouns, such as $[\text{push}_V \text{up}_P]_N$ and $[\text{run}_V \text{down}_P]_N$, consisting of a verb and a particle which are problematic since the category N(oun) comes from neither the verb nor the rightmost particle. With respect to prefixed words with *en-*, Williams accepts that *en-* bears the categorial feature V(erb) and that it serves as head and for formations such as *push up*, he states that such nouns derive from headless rules.

2.2.2 Selkirk (1982): The Syntax of words

As presented in the previous section, Williams identifies the head positionally as the constituent which appears on the rightmost edge of the word. A corollary of this is that suffixes are always heads, whereas, prefixes (with the exception of *en-*) are always non-heads. Williams' RHR makes another prediction as well; given that inflectional affixes appear at the rightmost edge of the word, they are heads as well. This idea, however, has been heavily criticized by Selkirk (1982) whose work can greatly inform our discussion on the relation between morphology and syntax and the notion head.

Selkirk (1982) aims to provide an examination of the *syntax of words*, that is, “the *structure of words* and the *system of rules* for generating that structure” (*ibid.*, 1). Selkirk

claims that although W-syntax (morphology) and S-syntax (syntax proper) make use of different categories and, moreover, combine these categories in a non-uniform way, the two share the same general properties.

Selkirk defends the idea that a W-syntactic model comprises a set of context-free rewriting rules and also proposes that a context-free grammar must be complemented with the following two basic notions of X' Theory in order to account for the derivation of W-syntactic structures: (a) a syntactic category is a pair of $(n, \{F_i, F_j, \dots\})$. This pair comprises a level specification n (number of bars) and a feature specification $\{F_i, F_j, \dots\}$ (F_i is a syntactic or morphological feature) which Selkirk calls *name*. (b) Phrase structure rules conform to the schema in (6), according to which all phrases have a head which bears the same features but one less bar level (from Selkirk, 1982: 6):

$$(6) \quad X^n \rightarrow \dots X^{n-1} \dots$$

On the assumption that morphological categories are in fact pairs of $(n, \{F_i, F_j, \dots\})$, the Word is of X^0 level. According to this proposal, phrases are of level X^0 and higher, whereas the category X^{stem} corresponds to (X^{-1}) (one bar level down from X^0 (= Word)). Similarly, X^{-2} corresponds to X^{root} . Of importance is that the features relevant to W-syntax are of two types:

- (a) *syntactic category features* such as noun and verb, and
- (b) *diacritic features* which include, among others, tense, gender, and declension class features.

A basic relation between S- and W-syntactic structures is that both structures contain a head. Consider the following schema from Selkirk (1982: 9) which indicates that a morphological structure of the category X^n is headed by the category X^m (where m is maximal) with which it shares the same features.

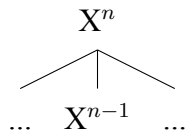
$$(7) \quad X^n \rightarrow \varphi X^m \Psi$$

where X is a variable standing for a complex of categorial features,
both syntactic and diacritic

On the basis of the above, let us comment in more detail on the notion head. To begin with, although both components (S- and W-syntax) share the general principle of headship, the identification of head in syntax and morphology differs in a significant way.

As shown in (8), in S-syntax, the head of X^n is the constituent which bears the same category features with it and is one less bar level than X^n :

(8) In a syntactic configuration



where X stands for some (same) set of category features,

X^{n-1} is the *head* of X^n . (Selkirk, 1982: 20)

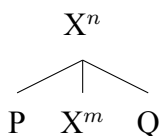
In W-syntactic structure, however, the schema in (8) does not lead to the identification of head. To adduce an example, one might take into inspection compounding. Compounds in Selkirk's terms are composed of two elements which are of the same bar level as the whole formation is; both the compound members and the compound as a whole are of the level X^0 (= Word) and, as a result, the head cannot be identified by the number of bar levels.

Another compound type which argues that there is a difference between morphological and syntactic headedness is $[N N]_N$ compounding. The schema in (8) fails to identify the head of such a compound since both constituents are of the same bar level as the whole formation and, in addition, both members are of the same category, i.e. they are nouns. In order to provide a solution to this issue, Selkirk embraces the RHR of Williams (1981b), but states that the RHR cannot be considered a universal rule but rather a parameter that has to be independently set for each language.² As we will see, there are languages such as Tagalog and Italian which exhibit left-headed compounds.

Selkirk also calls into question the status of inflectional affixes as heads, in that there are several languages that challenge the idea of inflectional affixes as heads since a single word may have more than one inflectional affix and she proposes a modification of Williams' RHR, as in (9):

(9) *Right-hand Head Rule (revised)*

In a word internal configuration,



²This idea can be traced in Lieber (1980).

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 . (Selkirk, 1982: 20)

Selkirk proposes this revision in order to take into account not only right-headed formations but also constructions where the RHR does not seem to apply, that is, words whose head-element is located on the left-most side of the formation and not on the right. Such formations are (a) constructions of the type [Verb Particle]_v such as *grow up* and (b) inflected forms.

The main difference between Selkirk's and Williams' definition of head is the postulation of an element Q on the right of the head constituent. The fact that Selkirk allows Q on the right of the head has the following consequences for morphological headedness. In a configuration $[P X]_x$ the head conforms to Williams' RHR since the head is predicted to be X . In a word with the structure $[X Q]_x$, however, Williams' and Selkirk's formulations make different predictions. For Williams, such a structure would be a counter-example to his RHR since it would be a case of left-headedness. Selkirk's revised RHR, however, allows one to maintain that such a structure is right-headed since Q that appears on the right edge of the word is not specified for the categorial feature X .

Selkirk also makes use of the mechanism of *Percolation* in order to account for the identity of features between an element and its head.

(10) *Percolation*

If a constituent α is the head of a constituent β , α and β are associated with an identical set of features (syntactic and diacritic). (Selkirk, 1982: 21)

The way percolation is stated in (10), however, does not take into consideration the relation between the whole formation and its non-head. Therefore, Selkirk (1982: 76) proposes a revision to the Percolation convention which reads as:

(11) *Percolation (revised)*

- a. If a head has a feature specification $[\alpha F_i]$, $\alpha \neq u$, its mother node must be specified $[\alpha F_i]$, and vice versa.
- b. If a nonhead has a feature specification $[\beta F_j]$, and the head

has the feature specification $[uF_j]$, then the mother node must have the feature specification $[\beta F_j]$. (Selkirk, 1982: 76)

This revision allows for feature percolation from the non-head constituents to the mother node in case the head is not specified for the particular features. In addition, the way percolation is stated in (11) ensures that the features of the head are always given priority.

2.2.3 Lieber (1980): Percolation conventions

The two accounts sketched above constitute the asymmetric approaches to headedness. Contrary to Williams and Selkirk, Lieber (1980) proposes a symmetric account for headship in affixation but an asymmetric one with respect to compounding. Lieber argues for a system with a single rewrite-rule that generates unlabeled binary structures into which constituents are inserted according to their *subcategorization frames* as illustrated by *happiness* in (12) (example taken from Lieber, 1980: 83).

(12) 

In order to account for the transmission of features from the head element to the whole (*node labeling*), Lieber (1980: 85-93) proposes four percolation conventions as in (13):

(13) Convention I: all features of a stem morpheme, including category features percolate to the first non-branching node dominating that morpheme.

Convention II: all features of an affix morpheme, including category features percolate to the first branching node dominating that morpheme.

Convention III: If a branching node fails to obtain features by Convention II, features from the next lowest labeled node are automatically percolated up to the unlabeled branching node.

Convention IV: In compound words in English, features from the right-hand stem are percolated up to the branching node dominating the stems.

As we will see in Section 2.2.6, it follows from these conventions that any outermost suffix could in principle serve as head. In addition, Lieber's conventions allow for feature percolation from the non-head in case the head is not specified for those features.

2.2.4 Lieber (1992): Backup percolation

The proposal that features from the non-head can percolate is also made by Lieber in later work (Lieber, 1992). According to her proposal, the following two feature percolation conventions are needed (from Lieber, 1992: 92):

(14) a. Head Percolation

Morphosyntactic features are passed from a head morpheme to the node dominating the head. Head Percolation propagates the categorial signature.

b. Backup Percolation

If the node dominating the head remains unmarked for a given feature after Head Percolation, then a value for that feature is percolated from an immediately dominated nonhead branch marked for that feature. Backup Percolation propagates only values for unmarked features and is strictly local.

Lieber's work also informs us on what features percolate and on the difference between *inheritance* and *percolation*. More analytically, Lieber proposes that diacritic features and argument structures do not percolate and that the way *Theta-grids* (argument structures) are passed from one node to another is accounted for by *inheritance* and not *percolation*. Finally, according to the above two conventions, only the morphosyntactic features which are of syntactic relevance in a particular language and which form the *categorial signature* percolate.

2.2.5 Di Sciullo and Williams (1987): Relativized head

In response to the problems with respect to whether certain morphemes, such as evaluative suffixes³ and prefixes, could be heads, Di Sciullo and Williams (1987) propose that there is a basic difference in the way the head is identified in syntax and morphology since in the former it is identified based on the number of bar levels (one less than the phrase), whereas in the latter, it is identified contextually. This allows them to propose a relativized notion of head as in (15):

³For a detailed discussion see Sections 2.2.6 and 4.7.3.

(15) Definition of “head_F” (read: head with respect to the feature F):

The head_F of a word is the rightmost element of the word marked for the feature F. (Di Sciullo and Williams, 1987: 26)

This definition of head, for example, allows Di Sciullo and Williams to propose that in diminution the head is not the category-less suffix but the element that is defined for the feature F_{category} , in this case, the base. In addition, in response to Selkirk’s (1982) criticism with respect to the presence of more than one inflectional affixes in words, a criticism that challenges the idea that inflectional affixes are heads, Di Sciullo and Williams propose that *relativized head* allows for multiple heads. This means that a word may have more than one head, since a constituent can assume the role of head, only with respect to some features. For example, in a word such as *amabitur*, both *bir* and *tur* are heads for head_{future} and head_{passive} respectively.

2.2.6 Comparison of symmetric and asymmetric accounts

In this section, I compare the symmetric and asymmetric accounts defended by Williams, Selkirk, and Lieber by presenting evidence from affixation (suffixation and prefixation).⁴ This comparison will allow us to understand the way percolation conventions work and to introduce some of the issues that will concern us in the present work.

2.2.6.1 Suffixation

To begin with, as far as category-changing suffixation is concerned, all three accounts make the same prediction; the affix determines the category of the whole. Williams’ RHR and Selkirk’s revised RHR predict that the affix *-ion* in the word $[[\text{constuct}]_V \text{ion}]_N$ is the head since it is on the right-hand side and consequently it transmits its categorial features to the whole. Lieber’s conventions, namely Convention I and Convention II, derive the same effect in two stages: (a) first, Convention I labels the non-branching node as V and (b) second, the affix labels the first branching node as N.

With respect to category-maintaining suffixation, however, the asymmetric accounts and the symmetric account of Lieber differ significantly. A case of suffixes that do not change the category of the base they attach to is manifested in evaluative suffixation.

⁴I shall not comment on compounding since both Williams’ RHR and Lieber’s conventions argue that the head in compounds is identified positionally. For a discussion on the position of head see Part III.

Italian, for example, provides us with words such as *alberino* ‘little tree’ and *librone* ‘big book’ in (16) (all examples taken from Scalise, 1988: 233):

- (16) a. *albero* → *alberino* ‘tree – little tree’
 b. *giardino* → *giardinetto* ‘garden – nic. (little) garden’
 c. *libro* → *librone* ‘book – big book’
 d. *ragazzo* → *ragazzaccio* ‘boy – bad boy’

These examples pose a number of problems for Williams’ RHR since affixes like *-ino* and *-etto* in Italian seem to be transparent to category or category-less and, therefore, the constituent which acts as head is not the rightmost suffix but the leftmost stem that serves as the base for the derivation. The idea that the head can be identified linearly, as the RHR dictates, is being seriously challenged by such data.

On the assumption that these affixes have no categorial features, words such as *alberino* do not pose a problem for Lieber’s symmetrical analysis of suffixation. According to the percolation conventions in (13), the stem percolates its categorial features (Convention I) but the fact that evaluative suffixes have no categorial specifications on their own means that Convention II cannot apply. This problem is solved with the introduction into the theory of Convention III, according to which when Convention II fails to apply, the categorial features percolate from the next lowest labeled node, in this particular case the features of the stem (base).

2.2.6.2 Prefixation

Let us turn to prefixation. It follows from the RHR that no constituent on the left should be considered head. In other words, there is no (categorial) percolation from leftmost constituents. Lieber’s conventions, however, make a different prediction; any outermost suffix could in principle serve as head. Once more, let us examine these predictions on the grounds of category-maintaining and category-changing prefixation.

A characteristic example of a prefix which does not affect the category of the base it attaches to is *counter-*. As illustrated in (17), *counter-* can freely attach to nouns, verbs, and adjectives.

- (17) a. [counter [weight]_N]_N
 [counter [revolution]_N]_N
- b. [counter [sign]_V]_V
 [counter [sink]_V]_V
- c. [counter [intuitive]_A]_A
 [counter [productive]_A]_A

The right-headedness of these formations can be easily accounted for by both the RHR and Lieber's conventions. Consider for example the derivation of *counter-productive*. For Williams, the element which serves as head and which provides the whole formation with its category is the right-hand element, i.e. *productive*. For Lieber, Convention I applies to label the first non-branching node as A, but since *counter-* is transparent to categorial features, Convention II does not apply. Convention III, then, applies and as a result the feature A percolates to the binary branching node.

Let us examine now category-changing prefixation. It has been noted in the literature that several languages have prefixes that seem to be able to change the category of the base they attach to. Some examples with the English prefixes *en-* and *de-* are provided below:

- (18) a. [en [rage]_N]_V
 [en [case]_N]_V
 [en [dear]_A]_V
 [en [noble]_A]_V
 [en [rich]_A]_V
- b. [de [louse]_N]_V
 [de [plane]_N]_V

The analysis of the prefix *en-* shows that it can attach to nouns and adjectives and produce verbs. This means that it could be assigned a category and as we presented in Section 2.2.1, Williams accepts *en-*prefixation as a systematic counterexample to the RHR. Contrary to the asymmetrical proposal defended by Williams, Lieber allows for feature percolation from any of the outermost morphemes. The percolation Conven-

tions would derive the following results with respect to a prefixed word such as *enrage*: *rage* percolates its categorial feature N to the first non-branching node dominating it and Convention II labels the first branching node dominating the prefix *en-* as V since *en-* is specified for the category V.

Finally, Lieber's conventions, as well as Selkirk's revised RHR (see Section 2.2.2), contrary to Williams' RHR, allow for the percolation of features from the non-head in case the head is not specified for these features.

2.3 Conclusions

The purpose of this chapter was to provide a brief overview of the emergence and development of the notion of head in morphology. This overview allowed us to present some of the divergent views on whether all or some constituents are heads and to enquire into the use of this notion in syntax and morphology.

Williams' RHR argues that the head in morphology is to be identified positionally as the right-most element of the word, but as we saw there are several counterexamples to this rule (*en*-prefixation, left-headed compounds). The work of Selkirk (1982) shows that the W-syntactic is distinct from the S-syntactic component and that the identification of head in morphology and syntax differs significantly since the head in morphology, contrary to syntax, is not identified by the number of bar-levels. Lieber's (1980) *percolation conventions* introduce a symmetrical account of headship in affixation since any outermost suffix could in principle serve as head and Lieber's (1992) work informs us on which features percolate and on the difference between *inheritance* and *percolation*. Finally, the notion *relativized-head* proposed by Di Sciullo and Williams (1987) undermines the relation between the syntactic and the morphological notion head since the head in syntactic constructions is never identified contextually.

The rest of this thesis answers in more detail the questions implied above with focus on the delimitation of head, the head-nonhead linearization, and the presence or absence of head. The brief presentation of the seminal works of Williams (1981b), Selkirk (1982), Lieber (1980, 1992), and Di Sciullo and Williams (1987) will allow us to delve more deeply into the study of headship, since a number of modern theoretical approaches are based on these works. By way of example, as we will see in Part IV, the

proposal that head should be relativized is also made in recent accounts of exocentricity.

Part II

On the definition of head

Delimiting head

In this chapter, I undertake the first stage of my study with an examination of the notion head with respect to Word Formation. In Section 3.1, I present the criteria used in the relevant literature with respect to the identification of head in both syntax and morphology focusing on the works of Zwicky (1985) and Bauer (1990). In Sections 3.2 and 3.3, I elaborate upon the delimitation of the notion head in morphology. More specifically, in Section 3.2, I apply a number of criteria to category-maintaining and category-changing affixation (suffixation and prefixation) and in Section 3.3, I focus on compounding. Section 3.4 discusses the results of the application of the various headship criteria to affixation and compounding and concludes that the head for the purposes of morphology should be identified with the *category determinant*. Section 3.5, concludes this chapter.

3.1 Criteria for headship

Several criteria with respect to the identification and definition of head in both syntax and morphology have been proposed in literature. Of these, I cite the following eight with respect to syntactic headship from Zwicky (1985). The head of a syntactic con-

struction is:

- (a) The *semantic argument*: the element whose meaning serves as “argument” to some “functor”.
- (b) The *subcategorisand*: the constituent which is subcategorized with respect to its sisters.
- (c) The *morphosyntactic locus*: the element which bears the inflectional material which marks the syntactic relations between the whole formation and other syntactic units.
- (d) The *governor*: the element which determines the form of the governed constituent which appears as its sister.
- (e) The *determinant of concord*: the constituent which determines the agreement features which appear on other constituents.
- (f) The *distributional equivalent*: the constituent whose distribution is the same with the distribution of the whole formation.
- (g) The *obligatory constituent*: the element whose presence is obligatory.
- (h) The *ruler* in dependency grammar: the constituent on which co-constituents depend.

Zwicky argues that the application of these head-like notions to a number of constructions yields conflicting results and concludes that the only head-notion which is needed for the purposes of percolation, is (c) and, as a result, the head in syntax should be identified with the *morphosyntactic locus*.¹

Bauer (1990) applies a number of syntactic head-like notions, including the criteria by Zwicky, to English affixation (Bauer does not examine compounds) and argues that a definition of morphological headedness based on syntax should be dispensed with and that “no generalization about heads in English morphology is going to remain tenable unless ‘head’ is delimited very specifically” (*ibid.*, 30). In what follows, I delve

¹The application of these criteria by Hudson (1987), however, yields different results and Hudson proposes that the head of a syntactic formation has all these properties.

more deeply into the delimitation and definition of the notion head in morphological configurations.

For the purposes of morphological headship, the debate usually revolves around three head-like notions as follows:

- (a) *semantic head*: the whole is a hyponym of its head element,
- (b) *categorial head*:² the head is the element which determines the category of the whole, and
- (c) *morphosyntactic head*: the head is the constituent which percolates its morphosyntactic features such as gender and inflection class to the whole formation.

Although several researchers propose that (b) and (c) coincide and that they comprise a single head property, in my opinion it is both theoretically and empirically judicious to make a distinction between the categorial and morphosyntactic properties of a constituent. I am, of course, not the first to make this distinction. As discussed in Chapter 2, Selkirk (1982) in her seminal work distinguishes between *syntactic category* features such as noun and verb and *diacritic features* such as tense, gender, and declension class features.

Of the three head-like properties, the categorial property is often considered to be the most important and most scholars tend to propose that only this property should be identified with the notion head and vice versa, that is, the notion head is to be identified only with the categorial property (see for example Hoeksema, 1992; Hall, 1992; and more recently Kageyama, 2010). Based on the distinction between headship in conjunctions and disjunctions in syntax, for example, Hoeksema (1992: 120) rejects the semantic criterion. Consider the following:

- (1) a. She walks and talks.
- b. She walks or talks.

The identification of head based on the semantic criterion in (1a) tells us that both verbs are heads, whereas the application of the same criterion to (1b) leads to a problem; the disjunction is headless. Based on this, Hoeksema proposes that the semantic criterion

²This notion of head can also be found in the literature as the *technical* definition of head (Hoeksema, 1992).

should be rejected since it does not seem theoretically grounded to distinguish between the properties of the head in conjunctions and disjunctions.

Even Bauer (1990) in his critical assessment of the notion head comments that “heads might be saved if it was assumed that only major categories percolated through heads” (*ibid.*, 30). The priority of the categorial head is also evident in the way morphological theory makes a distinction between category-maintaining and category-changing affixes, since affixes are distinguished into those which can change the category of the base they attach to and those which have no categorial properties.

In the rest of this chapter let us enquire into the notion head in morphology in an effort to identify the property (or properties) of head. Section 3.2 comments on the head of derived words and Section 3.3 provides a detailed analysis of Greek compound structures which can inform our discussion on the definition and identification of head in morphology.

3.2 Head in derivation

Of the various head-like notions employed in the literature, those which are considered to be the most relevant to affixation and which are to be used in our discussion are the following:

- (a) Categorial head
- (b) Semantic head (Hyponymy test)
- (c) Morphosyntactic head
- (d) Subcategorizand
- (e) Morphosyntactic locus
- (f) Obligatory constituent

3.2.1 Suffixation

The application of the six head-like notions listed above to category-maintaining and category-changing suffixation—to the extent one can apply all of these notions—reveals the following:

3.2.1.1 Categorical head

It is usually assumed that the category of the whole is computed by the affix. The derivational suffix *-er*, for example, in (2), can be considered the categorical head of the word *player* since it is the element which is specified for the category N which is percolated to the whole formation:



According to the schema in (2), the categorial feature N of the word *player* comes from the suffix *-er* which attaches to the verb *play*.

In a similar vein, other category-changing affixes, such as the Greek *-iz(o)*, attach to nouns and form verbs. Consider the verb *filakizo* ‘to put in jail, imprison’ which consists of the noun *filak(i)* ‘prison’ and the suffix *-izo*:



In this example, *filak(i)*, which is a noun, is the non-head since the categorial information comes from the suffix which is a verb and which serves as the head of the formation.

As far as category-maintaining suffixation is concerned, the head based on the categorial test is identified with the base and not the suffix. Consider for example the Greek diminutive formation *purtel(i)* ‘small door’ which consists of the noun *port(a)* ‘door’ and the diminutive suffix *-el(i)*:



Given that Greek diminutive suffixes are category-less, the category of the whole is computed by the base.

3.2.1.2 Hyponymy test

As far as the application of the hyponymy test is concerned, it is quite difficult to identify the head of derived words on semantic grounds. This difficulty is particularly evident in the case of *transpositional* affixes, that is, affixes which change the category of the base they attach to without adding an extra meaning (Beard, 1995).³ Consider for example the adjective *istorikos* ‘historical’ which consists of the noun *istori(a)* ‘history’ and the affix *-ik(os)* which bears the categorial specification adjective. The whole formation cannot be said to be a kind of *istoria* but we cannot claim that it is a hyponym of the suffix either.

Other suffixes, though, such as *-er* (Bauer, 1990: 5) and suffixes which diachronically derive from constituents which used to serve as heads of compounds, allow one to propose that the hyponymy test applies to some (but not to all) derivational affixes. Bauer (1990: 5), however, warns us that “this seems to be more on the basis of characterization than on any strict hyponymy criterion”. The suffix *-hood* which originates from the Old English *-had* ‘condition, position’ (from Proto-Germanic **haidus* ‘manner, quality’) could serve as an indicative example (Haspelmath, 1992: 71). One for example can certainly not claim that *parenthood* is a ‘kind of’ *-hood*, but one could propose that since *-hood* describes a state, the formation as a whole is, indeed, a ‘kind of’ state. As a result, the whole could be seen as a hyponym of its head element, *-hood*.

The application of the hyponymy test to category-maintaining suffixation shows that the head is the base and not the suffix. By way of example, as a whole, the formation *purtel(i)* ‘small door’ denotes a kind of house.

3.2.1.3 Morphosyntactic head

The third head-like notion which should be addressed is the morphosyntactic head. According to this notion, the head is the element which determines the morphosyntactic features of the whole. The assumption made by most scholars is that suffixes are specified for certain morphosyntactic features which are transmitted to the whole formation. The Greek suffix *-tis* ‘-er’, for example, is a noun of masculine gender and inflects ac-

³Lieber (2004) shows that even transpositional affixes have a semantic contribution as we will see in Chapter 4.

ording to Inflection Class 2.⁴ In a similar vein, *-iz(o)* is a verb of the first conjugation class and as such it determines that the word *filakizo* ‘put in jail’ will bear the verbal morphosyntactic features of the suffix (Ralli, 2005).

With respect to the morphosyntactic feature gender and the assumption that affixes have their own morphosyntactic features, consider the masculine *pektis* and the feminine *pektria*:

- (5) a. *pektis* < *pez(o) -tis*
 player.N.M play.V DsufN.M
 ‘male player’
- b. *pektria* < *pez(o) -tria*
 player.N.F play.V DsufN.F
 ‘female player’

The difference in gender between *pektis* and *pektria* is attributed to the distinct suffixes *-tis* and *-tria* which have their own gender specification; *-tis* forms masculine and *-tria* forms feminine nouns.

In category-maintaining suffixation the head based on the morphosyntactic criterion is the suffix and not the base. The diminutive suffix *-aki*, for example, attaches to masculine, feminine, and neuter nouns which belong to various inflection classes, and turns them into neuter nouns which inflect according to IC6. Consider the following with focus on the features gender and IC:

- (6) a. *anthropaki* < *anthrop(os) -aki*
 little man.Neut.IC6 man.M.IC1 Suf.Neut.IC6
- b. *kareklaki* < *karekl(a) -aki*
 little chair.Neut.IC6 chair.F.IC3 Suf.Neut.IC6
- c. *daktilaki* < *daktil(o) -aki*
 little finger.Neut.IC6 finger.Neut.IC5 Suf.Neut.IC6

Observe, for example, that the attachment of *-aki* to the noun *ánthropos* ‘man’, which is masculine and inflects according to IC1, creates a suffixed word which is neuter and which belongs to IC6.

⁴On Greek inflection classes see Ralli (2005).

To conclude, based on the morphosyntactic criterion, the suffix is the head in both category-maintaining and category-changing suffixation.

3.2.1.4 Subcategorizand

Based on this criterion, the head is the element which is subcategorized in terms of the bases with which it can co-occur. To put it bluntly, the head is the element which selects the non-head.

As far as suffixation is concerned, one of the main characteristics of suffixes is that in their lexical entry they come with a *subcategorization frame* which specifies the properties of the base they attach to and various analyses have been proposed in order to account for their selectional properties. It is usually assumed that an affix selects a stem to combine with on the basis of the categorial specification of the base (c-selection) and Aronoff (1976), for example, has proposed the *Unitary Base Hypothesis*, according to which affixes combine with bases of a single category. This hypothesis, however, has proven untenable since certain affixes select for bases which belong to different categories. Consider for example *-er* which combines with both verbs and nouns:

- (7) V writer, baker
 N Londoner, villager

Recent developments (mostly in the field of Lexical Semantics) show that what is needed to capture the distribution of affixes is not the category, but the semantic specifications of the base instead (s-selection). Lieber (2004, 2007) and Plag (2004) are some notable works which entertain this idea and try to work out how selection can be semantic instead of syntactic.⁵

Suffixes can also be subcategorized in terms of the morphemes with which they can co-occur based on the diacritic features of the latter. The Greek deverbal suffix *-aro*, for example, very often attaches to bases which are specified as [–Native]:

- (8) a. *skoraro* < *skor* (Engl. score) *-aro*
 ‘to score’
 b. *guglaro* < *gugl* (Engl. google) *-aro*

⁵For more on this see Chapter 4.

‘to search for something on the internet’

The examples in (8) show that the suffix *-aro* can be added to English bases in order to create verbs.

The foregoing discussion shows that in category-changing suffixation, the affix is the subcategorizand since it selects the base it attaches to on categorial and semantic grounds. In any case, by the criterion of subcategorization, the base is considered to be the non-head.

Plag (1999), however, puts forward the idea that bases, and, specifically, those that contain certain affixes can be subcategorized for a certain kind of affix. In other words, Plag argues that there might be base-driven selection. Consider the deverbal nominal suffixes *-age* (*steerage*), *-al* (*betrayal*), *-ance* (*annoyance*), *-ment* (*containment*), and *-y* (*assembly*). Fabb (1988) has shown that these suffixes do not attach to already suffixed bases. Plag argues that this behaviour can be explained not only in terms of affix-selection, but also as a restriction imposed by the base. In principle, the verb-forming suffixes which could appear before these nominal suffixes are *-ify*, *-ize*, and *-ate*. These verbal suffixes, however, combine with *-(at)ion*; words containing the affix *-ize*, for example, cannot be followed by the affixes *-age*, *-al*, *-ance*, *-ment*, and *-y*:

(9) verbalization

*verbalize-age

*verbalize-al

*verbalize-ance

*verbalize-ment

*verbalize-y

According to Plag, this selectional property should be attributed to the base, in that a word which contains the verbal affixes in question selects the suffix *-(at)ion* and not the suffixes *-age*, *-al*, *-ance*, *-ment*, and *-y*. Plag, however, acknowledges that it could be the case that *-(at)ion* is subcategorized to appear with *-ate*, *-ify*, and *-ize*, but argues that this solution would not be able to take into account the particular behaviour of the suffixes *-age*, *-al*, *-ance*, *-ment*, and *-y*. On the assumption that Plag’s analysis is correct, the subcategorizand in this respect is the base and not the affix.

Let us now turn to the examination of category-maintaining suffixation. Research

has shown that as far as Greek evaluative suffixes are concerned, the element which is subcategorized to co-occur with other morphemes is the suffix and not the base. Consider the following from SMG and the Griko dialect (Filieri, 2001; Melissaropoulou and Ralli, 2008):

- (10) a. *port-ula* < *port(a) -ula* SMG
 ‘little door’ door.F Suf.
- b. **vaz-ula* < *vaz(o) -ula*
 ‘little vase’ vase.Neut Suf.
- (11) a. *ornit-eddha* < *ornit(a) -eddha* Griko
 ‘little hen’ hen.F Suf.
- b. **ner-eddha* < *ner(o) -eddha*
 ‘little water’ water.Neut Suf.

Observe that the suffixes *-ula* and *-eddha* are subcategorized to attach only to feminine bases. Therefore, **vaz-ula* and **ner-eddha* are rendered ungrammatical; both *vazo* and *nero* are of neuter gender.

Another argument in favour of the proposal that the suffix is the subcategorizand comes from that *-a(k)i* in the Griko dialect attaches only to neuter nouns ending in *-i*, whereas the suffix *-uddhi* combines with bases ending in *-o*:

- (12) a. *katal-ai* < *katal(i) -a(k)i*
 ‘little spoon’ spoon.Neut Suf.
- **ner-a(k)i* < *ner(o) -a(k)i*
 ‘little water’ water.Neut Suf.
- b. *aderf-uddhi* < *aderf(o) -uddhi*
 ‘little brother’ brother Suf.
- **katal-uddhi* < *katal(i) -uddhi*
 ‘little spoon’ spoon Suf.

A comparison between *kutal-ai* and **ner-a(k)i* shows that although both *kutali* and *nero* are neuter, only the former meets the selectional restrictions imposed by the suffix *-a(k)i*; *nero* ends in *-o* and as such, it cannot serve as a base for the suffix *-a(k)i*. In a similar vein, *-uddhi* only attaches to *adelfo* and not to *kutali* since the latter ends in *-i*; *-uddhi* requires bases which end in *-o*.

To summarize, research shows that category-maintaining suffixes can act as subcategorizands and select the base they attach to.

3.2.1.5 Morphosyntactic locus

With respect to the locus of inflectional suffixes, Greek derived words show that the morphosyntactic locus is the suffix rather than the base. Consider for example the plural form of the word *pektis* ‘player’:

- (13) *pek-t-es*
 play-Dsuf-PL
 ‘players’

In this example, the inflectional suffix *-es* that marks the plural, appears on the suffix and not on the base, *pez(o)*. Therefore, the criterion of the morphosyntactic locus identifies the suffix as the head of the word.

In a similar vein, the locus inflectionis in category-maintaining suffixation is the suffix and not the base. The plural form of *anthropaki* ‘little man’, for example, is *anthrop-aki-a* (man-Dsuf-PL, ‘little men’); notice that the plural suffix *-a* appears not on the base, but on the suffix.

3.2.1.6 Obligatory constituent

Although this criterion may very well not be useful for morphological analysis, I will take obligatoriness into consideration for the sake of completeness. The criterion of obligatoriness cannot easily apply to morphology since it is not clear whether in suffixation, the obligatory constituent is the base or the suffix. I would, however, like to align myself with Bauer (1990: 9) who claims that “a word must contain a base, but it need not contain a suffix”.

3.2.1.7 Discussion

Table 3.1 summarizes the application of the six headship criteria to category-changing and category-maintaining suffixation.

Table 3.1: Summary of headship in suffixation

Criterion	a	b	c	d	e	f
Category-changing						
<i>pektis</i> ‘player’	A	A/? ⁶	A	A	A	B
<i>istorikos</i> ‘historical’	A	?	A	A	A	B
* <i>verbalize-al</i> ⁷	A	?	A	B	A	B
Category-maintaining						
<i>anthropaki</i> ‘little man’	B	B	A	A	A	B

A = Affix is the head; B = Base is the head

The analysis of category-changing suffixation shows that the suffix qualifies as the head with respect to criteria (a), (c), and (e). The suffix is the constituent which is responsible for the category and the morphosyntactic features of the whole, and, finally, it is the morphosyntactic locus, that is, the constituent on which inflectional material relevant to syntax appear. Not all criteria, however, identify the suffix as the head since the obligatory constituent seems to be the base and by this criterion the suffix is the non-head of the formation. In addition, the affix does not seem to be the subcategorizand in all cases (although in most instances it is the affix which selects the base it attaches to on categorial and semantic grounds) since based on the analysis provided by Plag (1999), the base can also select the affixes it combines with. Finally, the application of the semantic test of hyponymy is not easily applicable and the evidence is unclear.

With respect to category-maintaining suffixation, the base-word is the head based on the categorial and semantic criteria; the base provides the category and, in addition,

⁶To be more precise, even in this example the hyponymy test cannot be used for the identification of the “semantic” head of the formation.

⁷*verbalize* is the base and *-al* the suffix.

it serves as the hyperonym of the whole. The base is also the obligatory constituent. Not all criteria identify the base as the head since the suffix is the element which provides the whole with its morphosyntactic features. In addition, the suffix is the subcategorizand and the morphosyntactic locus.

3.2.2 Prefixation

Let us turn to the discussion of category-changing and category-maintaining prefixation focusing on English. As presented in Chapter 2, English possesses a number of prefixes, such as *counter-*, which have no category of their own and prefixes such as *en-* which can attach to a base and alter its category. In what follows, I apply the six criteria to category-maintaining and category-changing prefixation.

3.2.2.1 Categorical head

With respect to category-maintaining prefixation, there is agreement that the element which is responsible for the category of the whole is the base and not the prefix. Consider the following examples:

- (14) [counter [revolution]_N]_N
 [counter [sink]_V]_V
 [counter [productive]_A]_A

The prefix *counter-*, for example, attaches to the base *revolution* which is a noun but since the prefix has no categorial features, the category of the whole comes from the base. (Notice that this formal behavior of some category maintaining prefixes clearly militates against the *Unitary Base Hypothesis* since *counter-* attaches to bases of different categories.) Therefore, the head based on this criterion is the base and not the affix.

Category-changing prefixes behave in a different way since *en-* in (15) attaches to nouns and adjectives and turns them into verbs as exemplified by *enthrone* and *ennoble*.

- (15) [en [throne]_N]_V
 [en [noble]_A]_V

Therefore, the head in *en-noble*, contrary to category-maintaining prefixation, is the prefix and not the base.⁸

3.2.2.2 Hyponymy test

As with suffixation, the application of the hyponymy test to prefixed words is very difficult and yields unclear results. Bauer (1990: 11) argues that although the sentences in (16) show that *rewrite* is a hyponym of its base, *write*, the ‘kind of’ criterion is not easily applicable to reversative or negative prefixes:

(16) To rewrite something is to write it in a certain way.

When she wrote it, did she write it for the first time or rewrite it?

It is not clear, for example, whether *ex-president* is a ‘kind of’ *ex-* or *president*, although Bauer claims that the whole is most likely a hyponym of the prefix.

With respect to category-changing prefixation, the hyponymy test is not easily applicable, although it could be said that the prefixed word *en-throne* is a hyponym of the prefix rather than the base.

To summarize, the hyponymy test yields both unclear and conflicting results since it is not easily applicable to prefixation and at the same time it identifies either the prefix or the base as head or non-head of the formation.

3.2.2.3 Morphosyntactic head

As far as the morphosyntactic determinant in prefixation is concerned, one could claim that the head in category-changing prefixation is the prefix, whereas in the case of category-maintaining prefixation, it is the base that is responsible for the morphosyntactic features of the whole. The prefixed verb *de-throne* for example, can bear verbal affixes, i.e. *dethroned*, and this behaviour is certainly not to be attributed to the base, *throne*, which is a noun. On the contrary, in the case of *counter-*, the prefixed word

⁸Although Williams (1981b) accepts that *en-* is a category-changing prefix, other scholars maintain that prefixes are not heads and that the RHR applies in prefixed words as well (see Trommelen and Zonneveld, 1986; Scalise, 1988). Scalise (1988), for example, proposes that the derivation of *enrich* proceeds as follows: prior to *en-*prefixation, $[\text{rich}]_A$ via zero derivation becomes a verb $[[\text{rich}]_A + \emptyset]_V$. This allows him to propose that prefixes never affect the category of their base.

bears the morphosyntactic features of its base; *counter-attacks*.PL (noun), *counter-acted* (verb) etc.

3.2.2.4 Subcategorizand

Much research shows that the head by this criterion is the prefix and not the base. The negative prefix *in-*, for example, selects bases marked for Latinateness (Plag, 2003: 100), hence the difference between *uneatable* and *inedible* (Bauer, 1990: 12). As we will see in later discussion, Lieber (2004, 2007) shows that prefixes can select the bases they attach to on the basis of the semantic features of the latter.

3.2.2.5 Morphosyntactic locus

The head by this criterion is the base and not the prefix since inflectional material can never appear on the prefix. By way of example, the suffix *-s* in the following sentence appears on the base and not on the prefix:

(17) They are co-authors.

In a similar vein, the locus inflectionis in category-changing prefixation is the base and never the prefix; e.g. *dethroned*.

3.2.2.6 Obligatory constituent

On the assumption that a word necessarily has a base but that the addition of an affix is optional, the head in prefixed words is the base and not the prefix.

3.2.2.7 Discussion

Table 3.2 summarizes the results of the application of the six headship criteria to category-changing and category-maintaining prefixation.

Table 3.2 shows that:

- (a) With respect to the category of the whole, the head in category-maintaining prefixation (e.g. *re-write*) is the base, whereas the base is the non-head in category-changing prefixation, since it is the prefix that serves as the element that determines the category of the whole (e.g. *en-noble*).

Table 3.2: Summary of headship in prefixation

Criterion	a	b	c	d	e	f
Category-changing						
<i>en-noble</i>	A	A/?	A	A	A	B
Category-maintaining						
<i>re-write</i>	B	B	B	A	B	B
<i>ex-president</i>	B	A/?	B	A	B	B

A = Affix is the head; B = Base is the head

- (b) The hyponymy test yields both conflicting and unclear results, and, as a result, the identification of the head should not be based on this criterion.
- (c) The morphosyntactic head is the base in category-maintaining prefixation, but the prefix in category-changing prefixation.
- (d) The subcategorizand is always identified with the prefix since prefixes can select the bases they attach to.
- (e) The head with respect to the morphosyntactic locus is always the base and never the prefix.
- (f) Finally, the prefix is the non-head and the base is the head on the assumption that a word necessarily contains a base but not an affix.

3.2.3 Discussion of headship in derivation

The application of the six headship criteria to derivation (suffixation and prefixation) reveals that the assumed head properties fail to identify a single element as the head of the word. On the contrary, all these properties are distributed amongst the base and the affix. The obligatoriness criterion for example identifies the base as head even if based on other criteria, the head is the affix. In category-changing prefixation, for instance, the non-head based on the obligatoriness criterion is the prefix, whereas based on the categorial criterion, the prefix is identified as the head of the word. In addition, the

morphosyntactic locus is always the right-most constituent and never the element which appears on the left (we will return to this in the discussion of compounds).

Before proceeding to the discussion of head in compounding, I would like to stress that if we wish to maintain a single head property for every morphological configuration, this property should be identified with the categorial property. Consider for example the following from Plag (2003, 2004):

- (18) a. [...] extending the notion of head to derived words in general [...] we can make an argument that affixes also act as heads, because they determine the syntactic category of the derived word. (Plag, 2003: 182)
- b. With English prefixes, the category of the derivative is usually inherited from the base, so that we can state that prefixes, in contrast to suffixes, are not heads. (Plag, 2003: 182-183)
- c. [...] prefixes are not acting as heads, i.e. they do not have a specific word-class of their own but are transparent for the word-class specification of the base. (Plag, 2004: 200-201)

As evident from the above, the only property we need to employ in order to decide whether an affix is the head of a word, is the categorial property. Prefixes such as *re-* are not considered heads not because of the fact that they are not the obligatory constituent, but simply because they cannot alter the category of the base they attach to. On the contrary, prefixes like *en-* and *de-* are considered heads, not because they are the subcategorizands, *re-* is the subcategorizand in *re-write* as well after all, but because *en-* and *de-* have specific categorial properties which are transmitted to the whole.

3.3 Head in compounding

Scalise and Fábregas (2010) in their examination of headedness in compounds conclude that although, cross-linguistically, there is evidence for the existence of heads in compounds, detailed language-specific research is needed in order to specify exactly the properties of heads. With respect to the identification of heads inside compounds, Scalise and Fábregas (2010: 110) propose that the underlined elements in the following compounds qualify as the head of their formations since “[they have] several properties

which are imposed on the whole compound”. The question of how many and which these properties are, has been hotly debated and no consensus has been reached.

- (19) a. It. cassa forte ‘box + strong, safe box’
 b. Sp. camposanto ‘field + holly, graveyard’
 c. Eng. green card

The compound *cassa-forte* for example is headed by *cassa* and not *forte* since the category of the whole comes from the former which is a noun and not the latter which is an adjective:

- (20) [cassa]_N [forte]_A → [cassaforte]_N ‘box + strong, safe’

The head of a compound can also be identified on semantic grounds as the element which serves as the hyperonym of the whole, as defined by the ‘IS A’ condition, according to which Z denotes a subclass of its head element Y (Allen, 1978: 11):

- (21) In a compound [[]_X []_Y]_Z, Z ‘IS A’ Y

The English compound *green card*, for example, is a kind of *card*. The combination of the categorial and semantic criteria is frequently employed in order to identify the head of a compound. Ralli (2013), for example, argues that the head in Greek compounds should be defined on the basis of both category and semantics.

The head of the compound is also considered to be the element which determines the morphosyntactic features of the compound. As exemplified by *head waitress*, if the head is feminine, the compound will be of feminine gender as well (Plag, 2003: 135).

Another assumed head property is that the head of a compound serves as the *morphosyntactic locus*. As Plag (2003: 136) argues, the plural marker does not appear on the non-head, but on the head, instead. Consider for example the plural of the compound *park commissioner* which is *park commissioners* and not *parks commissioner*; the latter denotes ‘a commissioner occupied with parks’ instead of ‘the commissioners of parks’. To sum up, the plural marker *-s* appears on the head *commissioner* and not on the non-head *park*.

The purpose of this section is to offer a detailed analysis of Greek compounds which could inform the discussion on the notion head. Along with the tripartite distinction

between semantic, categorial, and morphosyntactic head, the analysis of the compounds in (22) shows that other head-like notions could be proposed and tested.

To begin with, (22) contains examples of Greek compounds in which the identification of head is not problematic:

- (22) a. *agri-o-eli-a* < *agri(a) eli(a)* Cypriot
 wild-LE-olivetree-Infl wild olive-tree
 ‘wild olive-tree’⁹
- b. *aggi-o-plinisk-o* < *aggi(o) plinisk(o)* Cypriot
 dish-LE-wash-Infl dish wash up
 ‘to wash up dishes’
- c. *kitrin-o-le-o* < *kitrin(o) le(o)* Italiot
 yellow-LE-merle-Infl yellow merle bird
 ‘merle bird with yellow plumage’

In these examples, all criteria identify the second constituent as the head of the compound. In the compound *agrioliá*, for example, all head-like notions identify *eliá* as the head of the compound, in that, the whole formation

- (a) belongs to the category noun, which is the category of *elia* and not to the category adjective, which is the category of its non-head, *agria* (categorial criterion).
- (b) In addition, the compound is a hyponym of *eliá* (semantic criterion). *agri(a)* as a non-head serves to specify the subclass *agriolia* belongs to; *agrioliá* is not any kind of *eliá* but a specific subclass of *eliá* which is flagged by the first constituent.
- (c) Finally, the whole exhibits the same morphosyntactic features as *elia*, i.e. it is feminine and belongs to Inflection Class 3 (morphosyntactic criterion).

A closer inspection of these examples reveals that it could be argued that the head is also the element which serves as the *morphosyntactic locus* (*locus inflectionis*), that is, the element which bears the inflectional material which marks the syntactic relations between the whole formation and other syntactic units. In this respect, the inflectional suffixes appear on the head and not on the non-head. Consider the plural form of this compound in (23):

⁹For more on the Linking Element -o- which acts as a *Compound Marker* see (Ralli, 2005, 2013).

- (23) a. *agri-o-eli-es*
wild-LE-olivetree-PL
- b. **agri-es-o-eli-a*
wild-PL-LE-olivetree-SG
- c. **agri-es-o-eli-es*
wild-PL-LE-olivetree-PL
'wild olive-trees'

The ungrammaticality of (23b) shows that the inflectional information which marks the relation between the whole and other constituents in syntax cannot appear on the non-head. Not even the double marking in (23c) is an option for Greek compounds.

A caveat may be in order here. It is of importance to notice that the placement of inflection in the above examples should not be confused with those cases in which inflection marks the relation between the head and the non-head. Consider for example, the Ancient Greek compound, *noun-eche:s* (Ralli, 2013):

- (24) *noun-eche:s* < *noun* *eche:s*
'sensible' mind.ACC have

The difference between *noun-eche:s* and **agri-es-o-elia* (wild-PL-LE-olivetree) lies not in the element which bears the inflection markers, but in the function of inflection in each case. In *noun-eche:s*, inflection marks the relation between the compound constituents (the non-head appears in the Accusative because it serves as an internal argument of the verb) and not between the compound as a whole and other constituents in a syntactic construction as in **agriesoelia*.

Another head-property frequently voiced in the literature is that the head acts as a *governor*, that is, the element which determines the form of the governed constituent which appears as its sister. More recently, Scalise and Fábregas (2010) have argued that the head imposes a dependency marker on the non-head. Consider, for example, the compounds in (25) from a variety of languages:

- (25) a. Dutch (Don, 2009: 380)
weer-s-voorspelling (weather-LE-forecast)

- b. German (Neef, 2009: 390)
boot-**s**-bau (boat-LE-building, ‘building of boats’)
- c. Polish (Szymanek, 2009: 466)
gwiazd-**o**-zbiór (star-LE-collection, ‘constellation’)
- d. Greek (Ralli, 2013: 13)
domat-**o**-salata (tomato-LE-salad, ‘tomato-salad’)

Based on this property, the linking element *-o-*, for example, which (at least phonologically) appears on the first member of Greek compounds (e.g. *domato-salata*, *agrio-elia*) could be analyzed as a marker of dependency, in that the head, as a governor, has the ability to determine the shape of its non-head.

To sum up, the analysis of compounds such as *agriieliá* indicates that the following properties seem to be characteristic of the head of a Greek compound:

- (a) The head determines the category the whole belongs to.
- (b) The head is the element which serves as a hyperonym of the whole (the compound denotes a subclass of the concept expressed by its head).
- (c) The head determines the morphosyntactic features such as gender and inflection class of the whole.
- (d) The head is the *morphosyntactic locus* (the bearer of inflectional markers).
- (e) Finally, the head is the *governor* (the constituent which determines the form of the governed constituent which appears as its sister).

It should be mentioned that the definition and identification of the properties of head in compounds is important since the universals that have been proposed for compounding in the languages of the world are related with this notion (for a discussion of this issue see Guevara and Scalise, 2009).

3.3.1 Is there selection in compounding?

Before proceeding with the application of these criteria to other compounds, I will digress a bit and first talk about whether there is selection in compounding and which

element is subcategorized to appear with other constituents, i.e. which element is the *subcategorizand*. As already discussed with respect to derivation, affixes come with a subcategorization frame in their lexical entry which specifies the kind of bases they attach to.

Scalise et al. (2005: 133) propose that “in compounding and in derivation there is *head-selection*”, that is, selection should be extended from derivation to compounding as well. Scalise et al. (2005: 140) argue for example that in the compound *apple cake*, the head selects the non-head on the basis of encyclopedic features; both are <edible> and, in addition, *cake* is <made with ingredients> and *apple* <can be an ingredient>.

(26) <i>apple</i>	<u><i>cake</i></u>
[Thing [+com,-abst,-an] ([])]	[Thing [+com,-abst,-an] ([])]
<physical>	<physical>
<shape>	<shape>
<edible>	↔ <edible>
<can be an ingredient>	↔ <made with ingredients>
<....>	<baked>
	<made for parties>

In my opinion, a basic problem with this proposal is that it is not clear why these scholars use the label *head-selection* and I think that this issue echoes the general problem of the definition and properties of head. As we saw in the previous section, the subcategorizand is not always the head since it is possible for (categorical) non-heads to act as subcategorizands. Prefixes, for example, impose specific selectional restrictions on the bases with which they combine. Therefore, being the subcategorizand might make a constituent an affix but it does not necessarily render it head of the formation (unless subcategorization is taken to be the only criterion for headedness).

Be that as it may, a major difference between selection in derivation and selection (if any) in compounding is that the former proceeds mainly on the basis of grammatical properties (e.g. category of the base), whereas the latter is largely a matter of encyclopedic information and, as a result, both its formalization and importance for morphological theory is rather vague.

To conclude, it should perhaps be better not to consider selection as a head-like

notion in compounds.

3.3.2 Testing “semantic head”

In what follows, I test the five assumed head properties which we identified in the compounds of the *agrioeleía* type in (22), using as test-ground compounds of various formal and semantic types. First, let us test the validity of the hyponymy test.

Although, it is usually assumed that the head of a compound is the hyperonym of the whole, not all compounds can be subjected to the hyponymy test. These compounds are formations which have undergone semantic drift or show a figurative meaning.¹⁰

Consider the following metaphorical compounds:

(27) *kamil-o-patim-a* < *kamil(a) patim(a)* SMG

camel-LE-step-Infl camel step

‘lit. step of a camel, metaph. type of plant with large leaves’

(Ralli and Andreou, 2012: 70)

lagud-atht-i < *lagud(i) atht(i)* Italiot

rabbit-ear-Infl rabbit ear

‘lit. ear of a rabbit, metaph. type of plant with large leaves’

tavan-o-skup-a < *tavan(i) skup(a)* SMG

ceiling-LE-broom-Infl ceiling broom

‘lit. broom for cleaning the ceiling, metaph. a very tall person’

The application of the five head-like properties to these compounds—I use *kamilopatima* as an indicative example—derives the following results:

(a) The whole is a noun as its right-most element *pátima* is.¹¹

(b) *kamilopátima* is not a hyponym of either *kamíla* or *pátima*. Neither *kamíla* nor *pátima* denote a kind of plant.

¹⁰For a detailed discussion see Section 4.6.

¹¹*kamíla* is a noun as well, but given standard assumptions, the categorial head in the vast majority of Greek compounds is on the right (see also the analysis of *aeropinno* in (28) the head of which is the verb *pínno* which appears on the right edge of the compound).

- (c) The compound as a whole bears the morphosyntactic features of its second constituent *pátima* and not the features of its left-most constituent, *kamíla*; the whole is of neuter and not of feminine gender and belongs to IC8 and not to IC3.
- (d) *pátima* is the morphosyntactic locus, in that inflectional markers appear on it.
- (e) Finally, *pátima* as the *governor* determines the form of the non-head which appears in the form *kamílo-*.

On the basis of the above observations, the hyponymy test yields no results, whereas all the other criteria identify the right-most element as the head of the compound *kamilopátima*. With respect to the distinction between categorial and morphosyntactic features, I would like to add that the categorial and morphosyntactic head in this compound coincide, in that the same element determines both the category and the morphosyntactic features of the whole.

Formations such as the Cypriot compound *aeropínno* and the Italiot *kakopiáno* are also problematic with respect to the identification of the semantic head:

- (28) a. *aer-o-pinn-o* < *aer(as) pinn(o)* Cypriot
 air-LE-drink-Infl air to drink
 ‘to waste time, to build on sand’
- b. *kak-o-pian-o* < *kak(a) pian(o)* Italiot
 bad-LE-catch-Infl bad to catch
 ‘treat someone in a bad way’

The application of the five head-like properties to *aeropínno* shows that:

- (a) The whole is a verb as its right-most element *pínno* is.
- (b) *aeropínno* is a hyponym of neither *aer(as)* nor *pínno*. None of the two constituents serves as a hyperonym of the compound.
- (c) The compound as a whole bears the morphosyntactic features of its second constituent, *pínno*, and not those of its left-most constituent, *aer(as)*; the whole is a verb and not a noun and, as such, it inflects according to the paradigm of the verb *pínno*. For example, the compound in the past simple exhibits the allomorphy of the verb:

- (29) a. Simple present: *pínno* Past simple: *ípia*
- b. Simple present: *aeropínno* Past simple: *aeroípia*
- (d) *pínno* is the morphosyntactic locus, in that inflection appears on it.
- (e) Finally, the verb *pínno* as the *governor* determines the form of the non-head which appears in the form *aero-*.

The foregoing discussion strongly suggests to me that the identification of head based on the semantic test of hyponymy is problematic since this test fails to identify the head in compounds which show a figurative meaning or exhibit semantic drift. For example, neither in metaphorical nor in ‘lexicalized’ compounds does the semantic criterion serve as a test for the identification and, I would argue, definition of head despite that all the other (assumed) head-like notions identify the same element as head.¹²

As a last remark on the use of the notion head with respect to the semantics of compounds, I would like to add that the hyponymy test forces us to propose two different analyses of head in compounds which may have two (or even more) readings: (a) a compositional one and (b) a reading which does not derive from the addition of the meanings of their constituents. Consider for example the following compounds (it should be borne in mind that in the following compounds we test the validity of the semantic test of hyponymy and not whether the metaphorical meaning is easily derivable from the two compound constituents):

- (30) *aggur-o-spor-os* < *aggur(i) spor(os)* Cypriot
 cucumber-LE-seed-Infl cucumber seed
 1. ‘cucumber seed’ 2. metaph. ‘a worthless person’
- ampel-o-gatt-os* < *ampel(i) gatt(os)* Cephalonia
 vineyard-LE-cat-Infl vineyard cat
 1. ‘cat which feeds itself at vineyards’ 2. metaph. ‘malformed person’
- alif-o-pit-a* < *alif(i) pit(a)* Epirus
 pig_fat-LE-pie-Infl ointment, pig fat pie
 1. ‘pie with pig fat’ 2. metaph. ‘who has the habit of flattering’

¹²For a detailed discussion of this issue see Section 4.6.

The application of the hyponymy test on both readings of the Cypriot compound *aggurósporos* shows that, based on the first reading, ‘cucumber seed’, *aggurósporos* is semantically headed by its right-most constituent, *spóros* ‘seed’. If we, however, base our analysis on the second reading, ‘a worthless person’, the compound has no head since the whole does not denote a kind of *aggur(i)* or *spóros*. It does not seem theoretically justified, however, to embrace the idea that the properties of the head of the compounds in (30) change according to a change in meaning. As we will see in Section 4.6, the difference between the first and the second reading should not be attributed to the presence or absence of head, but to the use of these compounds with a figurative meaning.¹³

3.3.3 Morphosyntactic features

The third assumed head-like property of compounds is that the head is the constituent which transmits its morphosyntactic features to the mother node as exemplified by *head waitress*. As presented above, given that the head of the word, i.e. *waitress*, is feminine, the compound is of feminine gender as well (Plag, 2003: 135). Compounds such as *agrioliá* ‘wild-olivetree’ in (22), show that this generalization might hold for Greek as well. Consider, however, the following (from Ralli and Andreou, 2012: 70):

- (31) a. *diavologinek-o* < *diavol(os) ginek-a* SMG
 devilish woman-Neut.IC5 devil woman-F.IC3
- b. *kefalovris-o* < *kefal(i) vris-i* SMG
 head spring-Neut.IC5 head spring-F.IC3
- c. *ambelopaxt-on* < *ambel(i) paxt-os* Cypriot
 vineyard tax-Neut.IC5 vine tax-M.IC1

The application of the five head-like properties to the SMG *diavologíneko* reveals that:

- (a) The whole belongs to the category noun, which is the category of *ginek(a)*.
- (b) The whole is a hyponym of *ginek(a)*; the whole denotes a devilish woman.

¹³For a different definition of head with respect to Lexical Semantics see Chapter 4.

- (c) As far as morphosyntactic features are concerned, the compound is of neuter gender and belongs to Inflection Class 5, despite the fact that *ginek(a)* which is the categorial head and the hyperonym is feminine and inflects according to IC3.
- (d) *ginek(a)* is the morphosyntactic locus, in that inflectional markers appear on it and not on the non-head. Consider for example the plural form of this compound. The plural marker for neuter, which is *-a*, appears not on the non-head (**diavol-a-gineko* ‘devil-PL-woman’) but on the right-most constituent (*diavol-o-ginek-a* ‘devil-LE-woman-PL’).
- (e) Finally, *ginek(a)* as the *governor* determines the form of the non-head which appears in the form *diavolo-*.

In this example, the right-most constituent is: (a) the categorial head, (b) the semantic head, (c) the morphosyntactic locus, and (d) the governor. The morphosyntactic test, however, argues that the head is not to be identified with the second constituent, namely *ginek(a)*.

The compound *diavologineko* is a typical case of a Greek compound which does not exhibit the same gender as its categorial head. Other compounds, nevertheless, exhibit the same gender as their categorial (and semantic) head but a different inflection class. The following examples illustrate this phenomenon:

- (32) *agiagkath-o* < *agi(o) agkath-i* Cypriot
 blessed thorn-Neut.IC5 blessed thorn-Neut.IC6
- agrotospito* < *agrot(is) spit-i* SMG
 farmhouse-Neut.IC5 farmer house-Neut.IC6

The application of the five head-like notions to *agiágkatho* shows that

- (a) *agiágkatho* belongs to the category noun, which is the category of *agkath(i)* and not to the category adjective, which is the category of *agi-* and, in addition,
- (b) the whole is a hyponym of *agkath(i)* since the compound denotes a kind of thorn.
- (c) As far as morphosyntactic features are concerned, the compound is of neuter gender and belongs to IC5, despite the fact that *agkath(i)* which is the categorial head and the hyperonym, is also neuter but it inflects according to IC6.

- (d) *agkath(i)* is the morphosyntactic locus, in that inflectional markers appear on it and not on the non-head.
- (e) Finally, the head as the *governor* determines the form of the non-head which appears in the form *agio-*.¹⁴

To sum up, the second constituent, *agkáth(i)*, is (a) the categorial head, (b) the hyperonym, (c) the morphosyntactic locus, and (d) the governor. In addition, although the second constituent and the compound as a whole have the same gender, i.e. both are neuter, the IC5 specification does not come from the second constituent.

The issue of transmission of morphosyntactic features becomes even more complex if one takes into consideration coordinate compounds composed of two nouns. Consider the compounds in (33):

- (33) a. *andr-o-gin-o* < *andr-* *gin-*
 man-LE-woman-Neut.IC5 man.M woman.F
 ‘married couple’
- b. *alat-o-piper-o* < *alat-i* *piper-i*
 salt-LE-pepper-Neut.IC5 salt-Neut.IC6 pepper-Neut.IC6
 ‘salt and pepper’
- c. *ginek-o-ped-a* < *ginek-a* *ped-i*
 woman-LE-child-Neut.PL.IC5 woman-F.IC3 child-Neut.IC6
 ‘women and children’

The following observations with respect to the morphosyntactic features of these compounds can be made: (a) The compound *andrógino* ‘married couple’ is of neuter gender despite the fact that none of its constituents is neuter; *andr-* ‘man’ is masculine and *gin-* ‘woman’ is feminine. (b) The word *alatopípero* is neuter just as its constituents are, but it inflects according to IC5, whereas *alat(i)* and *piper(i)* belong to IC6. (c) Finally, *ginekópeda* appears only in the plural and not in the singular.

These examples clearly show that the assignment of morphosyntactic features is not always a matter of transmission of features from a single element since in Greek and

¹⁴The compound marker *-o-* is deleted in this case for phonological reasons (Nikolou, 2003; Ralli, 2013).

several other languages (Wälchli, 2005), co-ordinate compounds often exhibit neuter gender irrespective of the gender value of their internal constituents and, moreover, some of them even appear only in the plural (*pluralia tantum*).

This morphosyntactic behaviour could probably be attributed to the fact that coordinate compounds usually express concepts which denote a group of entities or a collection of things. As far as our examination and evaluation of the notion head is concerned, the conclusion to be drawn is that the identification of head based on morphosyntactic features is problematic and it should, therefore, be reconsidered.

3.3.4 Verbs as heads

Another phenomenon which indicates that the attribution of morphosyntactic features is complex manifests itself in compounds which have a verb as a categorial head. As we saw in the previous sections, compounds which belong to the category of noun very often do not exhibit the gender and inflection class of their constituents since they usually belong to the neuter gender and they inflect according to Inflection Class 5.

Contrary to nouns, compounds which belong to the lexical category of verbs always bear the same features as their categorial head. This is evident in all types of verb-compounds either co-ordinate or sub-compounds. Consider the following examples; (34) contains sub-compounds and (35) gives examples of co-ordinate compounds of the $[V V]_V$ type:

(34) Sub-compounds

- | | | |
|----|--|---------|
| a. | <i>ambel-o-den-o</i> < <i>ambel(i) den-o</i> | Italiot |
| | vine-LE-tie-IC1 vine to tie-IC1 | |
| | ‘to tie the vines on stakes’ | |
| b. | <i>ather-o-kofk-o</i> < <i>ather(a) kofk-o</i> | Cypriot |
| | corn-LE-reap-IC1 ear of corn cut, reap-IC1 | |
| | ‘to reap the ears of corn’ | |
| c. | <i>aggel-o-thor-o</i> < <i>aggel(os) thor-o</i> | Cypriot |
| | angel-LE-see-IC1 angel see-IC1 | |
| | ‘to see the angel of death, to be scarred stiff’ | |

- d. *xart-o-pezo* < *xart(i) pezo* SMG
 card-LE-play-IC1 card play-IC1
 ‘play cards’

(35) Co-ordinate compounds

- a. *mpeo-vgevo* < *mpeo vgevo* SMG
 enter-LE-exit-IC1 enter-IC1 exit-IC1
 ‘go in and out’
- b. *anigo-klino* < *anigo klino* SMG
 open-LE-close-IC1 open-IC1 close-IC1
 ‘open and close’

The compounds in (34) and (35) belong to a wide range of formal and semantic classes since, for example, the meaning of *xartopézo* ‘play cards’ is easily derivable from the meanings of its constituents, whereas the application of the hyponymy test to the Cypriot *aggelothoró* when this compound is used with a metaphorical meaning, i.e. ‘to be scared stiff’, renders the compound headless. In addition, *atherokósko* is a subordinate compound and *mpeovgéno*, based on the terminology of Bauer (2008a), is an additive co-ordinated compound.

Despite the fact that Greek verbs belong to two distinct Conjugation Classes (Ralli, 2005), no change in the IC of the whole is attested in these compounds. On the contrary, compounds which are nouns tend to change gender and inflection class; even *agiágkatho* in (32), which is categorially headed by the neuter *agkath(i)* changes inflection class. This is further corroborated by the analysis provided by Ralli (2009a). Consider the following example taken from Ralli (2009a: 55):

- (36) *vrod-o-astraft-o* < *vrod-o astraft-o*
 thunder-LE-lightning-IC1 thunder-IC2 lightning-IC1
 ‘thunder-lightning’

As illustrated in (36), in co-ordinate compounds which are composed of two verbs of distinct conjugation classes, the whole inflects according to the inflection class of the verb which appears to the right-most edge. In this example, the compound inflects according to *astráfto* and not *vrodó*.

3.3.5 Left-headed [N N]_N compounds

In this section I would like to introduce an exceptional type of Greek compounds the head of which is on the left and which could inform our discussion on the notion head. For the purposes of the present argumentation and in order to keep the focus on the issues I consider to be central, I will not comment on why these formations are left- and not right-headed.¹⁵ Consider the following:

- (37) a. *karp-o-balsam-on* < *karp-os balsam-on* *Gal.14.166*
 fruit-LE-balsam-Neut. fruit-M. balsam-Neut.
 ‘the fruit of the balsam’
- b. *spod-o-kramb-e:* < *spod-ia kramb-e:* *Zos.Alch.p.226 B.*
 cabbage-LE-ash-F. ashes-F. cabbage-F.
 ‘cabbage-ash’

The examples in (37) comprise left-headed compounds of the structure [N N]_N. For example, in *karp-o-balsam-on*, the first constituent, i.e. *karpos* ‘fruit’, serves as the hyperonym of the whole (*karp-o-balsam-on* is a kind of *karpos* ‘fruit’) and, given standard assumptions, it is the categorial head.¹⁶

3.3.5.1 Morphosyntactic head

In what follows, I focus on three assumed head-like notions, namely the morphosyntactic head, the morphosyntactic locus, and the governor. The analysis of these compounds with respect to their morphosyntactic features shows that:

- (a) *karp-o-balsam-on* is of neuter gender, whereas the element which appears on the left-most side and which serves as the hyperonym and the categorial head of the compound, is of masculine gender. There are two solutions available to us in order to explain why the whole is of neuter gender: (i) this is the gender of its non-head (i.e. the right-most constituent *balsam-on*) and this constituent is responsible for the determination of gender or (ii) the neuter gender is explained by the tendency of Greek compounds to exhibit this particular gender. Although nothing argues

¹⁵For the analysis of the left-headedness of these formations see Part III.

¹⁶We saw that the hyperonym and the categorial head coincide in the majority of compounds.

in favour of one of these two solutions, the conclusion to be drawn is that the first constituent which serves as the hyperonym and the categorial head is certainly not the morphosyntactic head.

- (b) *spod-o-kramb-e*: is of feminine gender but we do not know which constituent is responsible for this gender specification since both of its constituents are feminine. As far as inflection class is concerned, this compound is inflected according to the IC of its right-most constituent, *kramb-e*: and not according to the IC of *spod-ia*. Based on the hyponymy and categorial tests, however, the right-most constituent is the non-head since the compound is a hyponym of its first (left-most) constituent.

This particular behaviour of left-headed compounds certainly complicates the analysis of the assignment of morphosyntactic features, but it is, nevertheless, very helpful with respect to our study of the notion head, since in the compound *spod-o-kramb-e*:, for example, the morphosyntactic ‘head’ is the right-most element. Based on the semantic criterion, however, the right-most element is not the semantic head and, consequently, it is not the categorial head either. This shows that the proposal that the morphosyntactic features of the whole are to be considered a head property should be reconsidered (unless the only criterion for the identification of head is taken to be the morphosyntactic one).

3.3.5.2 Morphosyntactic locus

Of particular importance is the claim that the head is the *morphosyntactic locus*, that is, the element which bears the inflectional material which marks the syntactic relations between the whole formation and other syntactic units. A word of caution must be added here. The notion *morphosyntactic locus* is not to be confused with the element which determines the morphosyntactic features of the whole. For example, even in the compound *diavologíneko* ‘devilish woman’ the gender of which is not identical to the gender of its constituents, the *morphosyntactic locus* is the second element, *ginek(a)* ‘woman’, which serves as the hyperonym and the categorial head.

In order to test the validity of the proposal that the head is the *morphosyntactic locus* consider the genitive form of *spod-o-kramb-e*:. The question is whether the genitive marker *-s* will appear on the first (hyperonym, categorial head) or on the second con-

stituent:

- (38) a. *spod-o-krambe:-s*
 ash-LE-cabbage-GEN
 ‘cabbage-ash’.GEN
- b. **spodo-s-krambe:*
 ash-GEN-cabbage
 ‘cabbage-ash’.GEN

The ungrammaticality of (38b) indicates that the morphosyntactic locus does not coincide with the semantic and categorial head, since *-s* appears on the right-most constituent.

3.3.5.3 Governor

The last head-like notion to be examined is the *governor*. According to this notion, the head has the ability to mark the relation with the non-head with a dependency marker on the latter. As we saw, in Greek compounding this marker is *-o-* (e.g. *diavol-o-gineko*, *agri-o-elia* etc.). The analysis of the left-headed compounds in (37) reveals that in all examples, the constituent which seems to be bearing this dependency marker is the left-most constituent which is the hyperonym and categorial head of the compound and not the right-most one, i.e. *spodo-kramb-e:*, *karpo-balsam-on*.

3.3.6 Discussion

Table 3.3 summarizes the results of the application of the five criteria for headship to Greek compounds.¹⁷

Table 3.3 reveals that the various criteria fail to agree and that the assumed head-like notions are distributed amongst the constituents. Only in the *agrioliá* type do all these notions coincide and identify a single constituent as head, in this particular compound, *eliá*.

¹⁷In the discussion of headship in compounding I have not included the obligatoriness criterion since I am not sure how to apply this criterion to compounds. Based on the results of Table 3.3, however, it seems that the obligatory constituent in compounding is the element which transmits its category to the whole.

Table 3.3: Summary of headship in Greek compounds

Criterion	a	b	c	d	e
<i>agrioliá</i> ‘wild olive tree’	S	S	S	S	S
<i>kamilopátima</i> ‘kind of plant’	S	NO	S	S	S
<i>aeropínno</i> ‘to waste time’	S	NO	S	S	S
<i>aggurósporos</i> ‘cucumber seed’	S	S	S	S	S
<i>aggurósporos</i> ‘worthless person’	S	NO	S	S	S
<i>diavologíneko</i> ‘devilish woman’	S	S	?	S	S
<i>agiágkatho</i> ‘blessed thorn’	S	S	?	S	S
<i>andrógino</i> ‘married couple’	BOTH	NO	?	S	S
<i>spodokrámbē</i> : ‘cabbage-ash’	F	F	S	S	S

S = Second constituent is the head; F = First constituent is the head

Let us now comment on the first three head-like notions which are considered central to morphology. The results summarized in Table 3.3 show that there is a link between the hyponymy test and the categorial head, in that whenever the hyponymy test identifies a constituent as the hyperonym of the whole, the same constituent is the one which is responsible for the categorial features of the compound. This generalization is particularly useful in the identification of the head in $[N N]_N$ compounds. Consider for example *aggurósporos* ‘cucumber seed’ which is composed of two nouns. Based on the categorial test we cannot be certain which is the categorial head, since both constituents are nouns. In this case we need to apply the hyponymy test which shows that the hyperonym and, therefore, the categorial head is the second constituent.

A caveat may be in order here. That the hyponymy test can be used as a complementary test in cases such as *aggurósporos*, does not mean that a compound should be considered headless when the hyponymy test fails.¹⁸

The results summarized in Table 3.3 can inform the discussion on the relation between categorial and morphosyntactic features since in a number of Greek compounds these features do not coincide. In *agiágkatho* ‘blessed thorn’, for example, both the se-

¹⁸For a detailed discussion see Chapter 4 and Part IV.

mantic and the categorial tests coincide and identify the second constituent as the head and the first constituent as the non-head, but the inflection class of the whole comes from neither the head nor the non-head. In addition, *spodokrámbe*: ‘cabbage-ash’, shows that the head based on the morphosyntactic criterion is the second constituent *krámbe*:, but based on the semantic and categorial tests *krámbe*: is the non-head.

If anything, the morphosyntactic and categorial features in the majority of Greek compounds should be considered distinct (on this also see Ralli, 2013). In addition, it could be the case that the assignment of morphosyntactic features to Greek compounds is not relevant to the head-nonhead asymmetry. Consider for example the compound *androgino* ‘married couple’ which as a whole is of neuter gender despite the fact that its constituents are of masculine and feminine gender respectively. As we have argued, this behaviour could be attributed to the fact that such compounds denote a collection of things and as such they are neuter, but, it is not clear at all whether this is related with the asymmetry between head and non-head.

Another observation is that the morphosyntactic locus and the governor are the only two head-like notions which constantly identify the second constituent as the head of the word. Table 3.3 shows that both notions identify the second constituent as the head of Greek compounds irrespective of the results of the other criteria and most importantly the semantic and categorial ones. In *spodokrámbe*:, for example, the second element, *krámbe*:, is the head and the first constituent, *spodós*, is the non-head since the former is the morphosyntactic locus and the governor; the right-most element *krámbe*: bears the inflectional material and *spodo-* appears with the dependency marker *-o-*. The semantic and categorial criteria, however, yield the exact opposite results, that is, *krámbe*: is the non-head.

3.4 General discussion

The discussion of headship in affixation and compounding shows that the various criteria fail to identify the same constituent as the head of the word and strongly suggests that several assumed head-properties, such as the *subcategorizand* and the *morphosyntactic locus* may in fact not be relevant to the head-nonhead asymmetry.

To begin with, the identification of head based on the hyponymy test should be

reconsidered since neither in affixation, nor in compounding does this test provide us with clear evidence as to the head of a word. We saw, for example, that by this criterion a number of affixed words, both prefixed and suffixed, are clearly headless. In addition, a more fundamental question which should be answered with respect to this criterion is the following. The hyponymy test can identify the hyperonym of the whole, but the reason for which the hyperonym should be identified with the notion head is far from clear (at least to me). In my opinion, failure of the hyponymy test to identify the hyperonym, does not render a formation headless.

As far as the notion *morphosyntactic head* is concerned, my analysis shows that we should not collapse this notion and the notion categorial head. Although it may hold for languages such as English that the element which provides the word with its category is the same element which serves as the morphosyntactic head, the morphology of fusional languages such as Greek argues in favour of not collapsing these two notions. In addition, my analysis of head in Greek compounding shows that the assignment of morphosyntactic features to a word may very well not always be relevant to the head-nonhead asymmetry. Co-ordinate compounds could serve as illustrative examples, since they show that other notions such as “collectiveness” and not the notion head should be employed in order to account for the neuter gender of these formations.

With respect to the *subcategorizand*, my analysis shows that this criterion should be used only with respect to affixation and not compounding. Therefore, the subcategorizand does not serve as a criterion for the identification of head in morphology since it does not apply to the morphological process of compounding; it is process-specific. In addition, even within affixation, the affix does not seem to be the subcategorizand in all cases since based on the analysis provided by Plag (1999), the base can also select the affixes it combines with. Finally, the criterion of subcategorization renders prefixes heads of their formations since they select the kind of bases they attach to, but this conclusion is not supported by the application of other criteria.

Let us now turn to the *morphosyntactic locus*. Based on this criterion, the head in both affixation and compounding is always identified with the right-most element irrespective of whether the element in question is the head by other criteria. In my opinion, the notion *morphosyntactic locus* is misleading and it should be dispensed with since it does not rely on the head-nonhead asymmetry. That the right-most element bears

the inflectional suffixes which mark the relation of the whole with other words in syntax could be explained by the fact that inflection in (Greek) compounds and derived words always appears on the right edge of the word. Therefore, we can never find compounds and derived words with internal inflection marking the relation of the whole to other words in a syntactic construction, and this is not the result of the asymmetric relation between the head and the non-head.

I would also like to suggest that as far as the *governor* is concerned, this notion is not relevant to the distinction between head and non-head either, since the element which bears (at least phonologically) the marker *-o-* in Greek compounds is determined positionally. This means that the left-most constituent of Greek compounds bears the marker *-o-* irrespective of whether it is a head or a non-head.

As far as obligatoriness is concerned, the usefulness of this criterion is dubious and it cannot serve as a headship criterion in morphology.

To conclude, the only head-like notion which should be given priority is the categorial one and the head in morphology should be identified with the *category determinant*. The distinction, for example, between affixes which are heads and affixes which are not heads is only based on whether a given affix can act as a category determinant. Prefixes (and generally affixes) which are heads can have categorial features which they transmit to the whole, whereas prefixes with no category specification are non-heads.

3.5 Conclusions

The purpose of this chapter was the delimitation of the notion head in morphology. The application of various assumed headship criteria to affixation and compounding showed that although there might be several *determinants* (e.g. morphosyntactic determinant), the head for the purposes of morphology should be identified with the *category determinant*.

This conclusion may be corroborated by the fact that the basic advantage of introducing the notion head from syntax into morphology is that it allows one to make use of the *mechanism of Percolation* (on this issue also see Zwicky, 1985) which, as we presented in the previous chapter, mainly accounts for the percolation of categorial features. The introduction of any other assumed head-like property must be theoretically motivated

and well justified. In any other case, it introduces an unnecessary complication into the literature and discussion on the notion head.

Morphology and Lexical Semantics

In Chapter 3, I defended a strictly categorial definition of head, in that the head in morphology should be identified with the *category determinant*. I also tried to show that the definition of “semantic head” on the basis of the hyponymy test should rather be reconsidered for the hyponymy test fails in several cases, yields contradictory results, and forces one to attribute different properties to the head of the same word when the latter has a literal and a figurative meaning.

In this chapter, I elaborate upon the way the head-nonhead asymmetry should be accounted for in Lexical Semantics. In order to do so, in Section 4.1, I present and adopt the framework of Lexical Semantics as developed by Lieber (2004). In more detail, I present the skeleton and Body distinction (Section 4.2) and the semantic features which form part of the lexical-semantic representation of morphemes (Section 4.3). In Section 4.4, I comment on the semantic representation of items lower than the level of word, that is, affixes, and in Section 4.5, I introduce the principle of co-indexation which accounts for the integration of several distinct parts, an affix and a lexical base in the case of derivation and two stems/lexemes in the case of compounding, into a single referential unit that projects its arguments to the syntax.

In Section 4.6, I delve more deeply into the study of the head-nonhead distinction in

Lexical Semantics. More specifically, in this section I argue that the head for the purposes of lexical semantics should be identified with the *ontological class determinant*. Based on this definition of head, in Section 4.7, I comment on the distinction between the subordination of functions with and without indexation; the former accounts for the affixation of argument and category bearing affixes (e.g. *-er*), whereas the latter handles affixation in the absence of arguments (i.e. inflection, prefixation, and evaluative morphology). In Section 4.7.1, I briefly comment on inflection and in Section 4.7.2, I argue that prefixes such as *re-* and *dis-* should be deprived of arguments. In Section 4.7.3, I provide a lexical-semantic analysis of evaluative morphology in Greek. A comparison between Greek evaluative affixes and the Greek affixes *-ia* and *-dzis* is provided and the analysis shows that evaluative affixes should not be considered heads.

In Section 4.8, I tackle the issue of classification of morphemes in Lexical Semantics. In particular, I argue that morphemes should be classified according to two main criteria: (a) the semantic features which are relevant to each lexical item and (b) the internal organization of the lexical-semantic representation of a morpheme. In this respect, a comparison between the prefix *re-* and the plural suffix *-s* is provided and the proposed analysis argues that these two affixes have shared properties which can only be accounted for under a lexical-semantic approach.

4.1 Lexical Semantics (Lieber, 2004)

Lieber (2004) develops her lexical-semantic framework in order to account for the semantics of word-formation processes, shifting the focus from the mere semantics of words to the semantic effects of derivation, compounding, and conversion. Lieber raises and fruitfully discusses the following four questions which are central to the characterization of the way morphemes combine with one another in order to form the meanings of words:

- (a) Why do derivational affixes often exhibit polysemy? For example, affixation of *-er* creates nouns that have several interpretations: (i) agent (*driver*), (ii) instrument (*opener*), (iii) experiencer (*hearer*), (iv) stimulus (*pleaser*), (v) measure (*fiver*), (vi) denominal noun (*villager*), (vii) patient/theme (*keeper*), (viii) location (*diner*).
- (b) Why are there affixes that create the same kind of derived words? For example,

both *-er* and *-ant* create agent nouns (*writer, driver, servant, accountant*).

- (c) How do we account for zero-affixation, that is, semantic change with no (overt) formal change?
- (d) Why are there instances where the form and meaning correlation is often not one-to-one?

Lieber rightly argues that a framework which would allow the discussion of these questions has been lacking since most studies in (generative) morphology have largely focused on the formal rather than the semantic part of morphological configurations.

According to Lieber, a system capable of dealing with the way morphemes combine to create the meaning of morphologically complex structures should have the following characteristics:

- (a) It must be decompositional and it should make use of primitives (atoms) of the right “grain size”.
- (b) It should be cross-categorial in order to allow an in depth analysis of all categories such as nominals and verbs.
- (c) It should be designed in a way that allows a treatment of the semantic properties of words (lexical-semantic properties) as opposed to semantic properties of other levels (e.g. phrases and discourses).
- (d) Finally, given that word-formation processes serve to extent the simplex lexicon, a lexical-semantic framework should allow one to deal with the semantics of simplex and complex words in a parallel way.

Although there are several frameworks which may have some of the characteristics mentioned above (Szymanek, 1988; Jackendoff, 1990; Pustejovsky, 1995; Wierzbicka, 1996), the framework developed by Lieber (2004) is the one which exhibits all of these characteristics. By way of example, Lieber who sees her work as “an outgrowth and extension of the work of Jackendoff and related theorists” (Lieber, 2004: 6), mentions that Jackendoff’s work is not cross-categorial enough.¹

¹For a discussion on the way Lieber’s work differs from other frameworks the reader is referred to Lieber (2004: 5-12).

In the present thesis, I have chosen to adopt this particular framework because it has been specifically developed to address questions pertaining to the meaning of morphological configurations and it, therefore, allows a discussion of the way morphemes combine in order to create words. In addition, although I will not have much to say on the semantic features which form part of the representation of lexical items, I hope that my work on the formal aspects and mechanisms of Lexical Semantics and specifically my enquiry into the notion head will inform the discussion on some of the paths already suggested by Lieber (2004).

4.2 Skeleton and Body

According to Lieber, lexical-semantic representations consist of two parts: the *Semantic/Grammatical Skeleton* and the *Semantic/Pragmatic Body* (henceforth Skeleton and Body respectively). The former is fully formalizable, decompositional, hierarchically arranged, it contains those aspects of meaning relevant to syntax, and it is stable from speaker to speaker. All speakers, for example, are expected to share the same skeletal information for particular morphemes. The latter is partially formalizable and systematic and it consists of two parts (Lieber, 2009: 83): (a) a part comprising the universal features that are semantically but not syntactically active in a given language and (b) a part encoding all those aspects of meaning that are perceptual, cultural, and encyclopedic, such as colour, function, and dimension. The first part of the body is largely stable from one speaker to the other, whereas the information encoded in the second part diverges.

Lieber (2004: 16) (following Jackendoff, 1990) proposes that a lexical-semantic representation and, more specifically, the *skeleton* comprises a function and one or more arguments predicated of that function (1a). As illustrated in (1b), functions and arguments of a skeleton are hierarchically arranged:

- (1) a. [F₁ ([argument])]
 b. [F₂ ([argument], [F₁ ([argument])])]

Lieber also assumes that all major lexical categories—nouns, verbs, and adjectives—are argument-taking. Following previous work (Williams, 1981a; Higginbotham, 1985), Lieber assumes that nouns take at least one argument, the so-called “R” argument; “R”

shows referentiality.

4.3 Semantic features

Lieber (2009) entertains the idea that there is a repository of universal semantic features into which every particular language has access. Lieber (2009: 85-86) proposes the following eighteen features which could form part of the set of universal semantic features: *material, dynamic, IEPS, CI, B, Loc, scalar, animate, human, female, age, artifact, n dimension, orientation, consistency, function, contact, and motion with respect to focal point.*

As mentioned in the previous section, a basic difference between the skeleton and the body is the fact that the former comprises those semantic features relevant to syntax and necessary for the study of word formation, whereas the formalizable first part of the latter consists of the remaining semantic features which are nevertheless syntactically inactive.

As far as English is concerned, Lieber (2004, 2007) proposes that the features which form part of a skeleton are seven. As illustrated in (2), the features that are encoded into the skeleton are presented in square brackets, whereas the features that are part of the body are enclosed in angle brackets (from Lieber, 2009: 85):

(2) FEATURES

[material]

[dynamic]

[IEPS]

[CI]

[B]

[Loc]

[scalar]

<animate>

<human>

<female>

<age>

<artifact>

- <n dimension>
- <orientation>
- <consistency>
- <function>
- <contact>
- <motion with respect to focal point>

The seven syntactically active features of English which are needed for the analysis of lexical meaning are defined as follows (from Lieber, 2009: 80):

(3) SEMANTIC FEATURES

[± **material**]: The presence of this feature defines the conceptual category of SUBSTANCES/THINGS/ESSENCES, the notional correspondent of the syntactic category noun. The positive value denotes the presence of materiality, characterizing concrete nouns. Correspondingly, the negative value denotes the absence of materiality; it defines abstract nouns.

[± **dynamic**]: The presence of this feature signals an eventive or situational meaning, and by itself signals the conceptual category of SITUATIONS. The positive value corresponds to an EVENT or Process, the negative value to a STATE.

[± **IEPS**]: This feature stands for ‘Inferable Eventual Position or State’. Informally, we might say that the addition of [IEPS] to a skeleton signals the addition of a path. The positive value implies a directed path, and the negative value a random or undirected path.

[± **Loc**]: Lexical items that bear the feature [Loc] for ‘Location’ are those for which position or place in time or space is relevant. For those items which lack the feature [Loc], the notion of position or place is irrelevant. Further, those which bear the feature [+Loc] will pertain to position or place. [-Loc] items will be those for which the explicit lack of position or place is asserted.

[± **B**]: This feature stands for ‘Bounded’. It signals the relevance of intrinsic spatial or temporal boundaries in a SITUATION or SUBSTANCE/THING/ESSENCE. If the feature [B] is absent, the item may be ontologically bounded or not, but its boundaries are conceptually and/or linguistically irrelevant. If the item bears the feature [+B], it

is limited spatially or temporally. If it is [-B], it is without intrinsic limits in time or space.

[± **CI**]: This feature stands for ‘Composed of Individuals’. The feature [CI] signals the relevance of spatial or temporal units implied in the meaning of a lexical item. If an item is [+CI], it is conceived of as being composed of separable similar internal units. If an item is [-CI], then it denotes something which is spatially or temporally homogeneous or internally undifferentiated.

[± **scalar**]: This feature signals the relevance of a range of values to a conceptual category. With respect to [-dynamic] SITUATIONS it signals the relevance of gradability. Those SITUATIONS for which a scale is conceptually possible will have the feature [+scalar]. Those SITUATIONS for which a scale is impossible will be [-scalar]. With respect to SUBSTANCES/THINGS/ESSENCES the feature [scalar] will signal the relevance of size or evaluation (i.e. this will be the feature which characterizes augmentative/diminutive morphology in those languages which display such morphology).

These features are used in (a) a cross-categorial, (b) an equipotent, and (c) a privative way. This means that these features are used to account for the distinction between the major lexical categories, they may have a positive or a negative value (binary value) and, in addition, they may or may not form part of the skeleton of a given morpheme. With respect to the privative use of these features, consider for example the feature [animate]. This feature may be used in the lexical-semantic representation of nouns, but it is not relevant to the discussion of the semantics of verbs. As a result, verbs should not be characterized by this feature.

As far as the cross-categorial use of these features is concerned, in this framework, the presence of these features in a skeleton classifies the morpheme into a major ontological class; the ontological class of SUBSTANCES/THINGS/ESSENCES is the notational equivalent of nouns and the class of SITUATIONS consists of verbs and adjectives. In (4), I present some examples of morphologically simple words:

- (4) a. truck [+material ([])]
 b. time [-material ([])]

- c. snore [+dynamic ([])]

The examples in (4) illustrate the simplest skeletal form a word can have, in that all examples bear only one semantic feature and only one argument in their skeletal part. As seen from the examples, the two features, [material] and [dynamic], can account for the distinction between the ontological classes SUBSTANCES/THINGS/ESSENCES and SITUATIONS; nouns are [material] and verbs are [dynamic]. The binary use of these features captures further distinctions which manifest themselves in these two classes. The presence of a positive or a negative value of the feature [material] derives the distinction between concrete and abstract nouns; *truck* is [+material], whereas *time* is [−material]. In a similar vein, the positive value of the feature [dynamic] characterizes the sub-class of EVENTS or PROCESSES. By way of example, *snore* in (4c) is [+dynamic]), whereas *know* in (5), which belongs to the sub-class of STATES is characterized as [−dynamic]:

- (5) know [−dynamic ([], [])]

Other skeletons may be more complex and consist of more than one feature:

- (6) a. chef [+material, dynamic ([])]
 b. war [−material, dynamic ([])]

The presence in (6) of the feature [dynamic] in the skeleton of a concrete or abstract SUBSTANCE/THING/ESSENCE informs us that the word in question is processual in nature. This category includes nouns such as *chef* and *war*, that is, nouns which may denote events and actions.

Adjectives are also characterized by the presence of two semantic features, namely [dynamic] and [scalar]:

- (7) a. red [−dynamic, +scalar ([])]
 b. dead [−dynamic, −scalar ([])]

In the examples in (7), we observe that adjectives belong to the major ontological class SITUATIONS and more specifically to the sub-class of STATES since they are characterized as [−dynamic]; they differ from stative verbs in that they bear the feature [scalar]. In addition, the positive or negative value of the feature [scalar] accounts for the distinction between gradable (e.g. *red*) and ungradable adjectives (e.g. *dead*).

So far we have seen that a word may bear one or more semantic features in its skeleton. In a similar vein, a skeleton may consist of one or more arguments. Consider the following:

- (8) a. leg [+material ([], [])] (e.g. the leg of the table)
 b. fond [−dynamic, +scalar ([], [])] (e.g. fond of pickles)
 c. kiss [+dynamic ([], [])] (e.g. kiss frogs)

The observation that some words such as *leg* and *fond* have two arguments will be important for later discussion (see for example the classification of compounds in Section 4.5.2).

So far, we have seen how the semantic features of the skeleton can be described in this framework but as we said, the representation of a lexical item consists of two parts, the skeleton and the body. In the following schemata I give the complete lexical-semantic representations of the words *author* and *bed* (from Lieber, 2009: 86):

- (9) a. author [+material, dynamic ([], [])]
 <+animate>
 <+human>
 <function>
 {writes for publication,...}
- b. bed [+material ([])]
 <−animate>
 <+artifact>
 <3 dimension>
 <horizontal>
 <function>
 {for sleeping, contains comfortable surface,...}

The examples in (9) show that the lexical-semantic representation of a word consists of three parts. The word *bed* for example consists of: (a) a skeleton which comprises the feature [material] and an argument, (b) a systematic part of the body which consists of those semantically active features which are, nevertheless, syntactically inactive, and

(c) a part of the body in which encyclopedic information about the lexical item is provided. According to the lexical-semantic representations in (9), *bed* is a concrete SUBSTANCE/THING/ESSENCE and *author* is a concrete PROCESSUAL SUBSTANCE/THING/ESSENCE.

4.4 The semantic representation of affixes

As we saw in the previous section, simplex lexical items such as *bed* and *love* have a lexical-semantic representation which consists of a skeleton and a body. The issue which arises is how we should treat elements below the level of word, that is, affixes.

Lieber (2004) proposes that affixes have a skeleton and that the semantic contribution of affixes can be accounted for by the same semantic features which are needed for the description of the semantics of simplex words. Consider, for example, the affix *-er*:

- (10) *-er*
 [+material, dynamic ([], <base>)]

The schema in (10) illustrates that affixes can have semantic features and arguments in their skeleton. The semantic contribution of the affix *-er*, for example, can be described as the addition of the features [+material] and [dynamic] to a <base>. More specifically, *-er* creates concrete and processual SUBSTANCES/THINGS/ESSENCES (nouns).² Notice, however, that although affixes have a skeletal part, the semantic content of an affix is abstract and underdetermined since affixes have no (or little) body.

The theoretical apparatus proposed by Lieber (2004) allows one to treat transpositional affixes and affixes like *-er* in a parallel way. As we saw in Section 3.2.1, transpositional affixes alter the category of the base they attach to without adding an extra meaning. The suffix *-al*, for example, attaches to verbs and creates the corresponding noun (e.g. *refuse* → *refusal*). Even the semantic contribution of these affixes can be formalized in the present framework. Consider the semantic representation of *-al*:

- (11) *-al*
 [−material, dynamic ([], <base>)]

Based on the skeleton in (11), the semantic content of *-al* (and other transpositional affixes) can be captured and formalized with the use of the same semantic features which

²For the way this is accomplished see Section 4.5.

are needed for the formalization of the meaning of simplex words and affixes such as *-er*; *-al* is characterized by the features [–material] and [dynamic] and, as such, it creates abstract and processual nouns.

4.5 The Principle of Co-indexation

The creation of a morphologically complex word involves not only the combination of two (or more) morphemes on a structural level, but also the integration of distinct morphemes on a semantic level. In order to account for the fact that several distinct parts, an affix and a lexical base in the case of derivation and two stems/lexemes in the case of compounding, integrate into a single referential unit that projects its arguments to the syntax, Lieber (2004) introduces the Principle of Co-indexation which reads as:

(12) Principle of Co-indexation

In a configuration in which semantic skeletons are composed, co-index the highest nonhead argument with the highest (preferably unindexed) head argument. Indexing must be consistent with semantic conditions on the head argument, if any. (Lieber, 2004: 61)

Lieber (2004: 50) argues that the highest argument of the skeleton is the argument of the outermost lexical function of the head. In addition, she proposes that there are two ways to create a skeleton, as schematically shown below:

(13) [αF_1 ([]], [βF_2 ([])])]

(14) [αF_1 ([])] [βF_2 ([])]

The schema in (13) illustrates the subordination of functions and the schema in (14) shows the concatenation of functions.

4.5.1 Co-indexation in derivation

Subordination of functions is manifested in derived words. According to Lieber, affixation involves the integration of two distinct skeletons; that of the affix and that of the base. Since affixes have their own skeleton, affixation involves the addition of this

skeletal material as the outermost function to the skeleton of a base, thereby subordinating the base in question as schematically shown in (13). The derivation of *driver*, for example, involves the co-indexation of the highest argument of the non-head, which is the verb *drive*, with the only argument of the head, which in this particular case is the affix *-er*. The skeletons of *-er* and *drive*, as well as the application of the principle of co-indexation are illustrated below:

(15) *-er*

[+material, dynamic ([], <base>)]

(16) *drive*

[+dynamic ([], [])]

(17) *driver*

[+material, dynamic ([_i], [+dynamic ([_i], [])))]

Since there are no semantic conditions on the head argument, the highest argument of the nonhead, in this particular case the verb *drive*, is co-indexed with the highest unindexed argument of the head, that is, the “R” argument of *-er*. The result of the co-indexation process is that the derived word should be interpreted as bearing the role of the external argument of the verb; in this case it is an agent.

Not all affixes have the same combinatorial properties as *-er*, however, since affixes such as *-ee* come with specific semantic requirements in their skeleton. Lieber (2004) argues that *-ee* has the following lexical-semantic representation:

(18) *-ee*

[+material, dynamic ([_{sentient, non-volitional}], <base>)]

It follows from the representation in (18) that *-ee* places specific semantic conditions on its co-indexed argument; it requires to be co-indexed with a sentient and non-volitional argument. Consider for example the derivation of the word *employee*:

(19) [+material, dynamic ([_{sentient, non-volitional-i}], [+dynamic ([], [_i])))]

-ee

employ

Given that *employ* as an activity verb has a volitional highest argument (external argument), the “R” argument of *-ee* is co-indexed with the internal argument of the verb. From this follows the ‘patient’ reading of the derived word.

4.5.2 Co-indexation in compounding

Compounds are formed by concatenation of skeletons with concomitant co-indexing. In what follows, let us present the way co-indexation works in the three compound types, namely, *coordinate*, *subordinate*, and *attributive* compounds.

4.5.2.1 Co-ordinate compounds

Lieber (2004, 2009) argues that in co-ordinate compounds, the very similar skeletons and bodies of the compound members allow for the complete identification of reference. Consider the compound *scholar athlete* (from Lieber, 2009: 90):

(20) <i>scholar</i>	<i>athlete</i>
[+material, dynamic ([_i])]	[+material, dynamic ([_i])]
<animate>	<animate>
<human>	<human>
<function>	<function>
{studies,...}	{plays sport,...}

The representation in (20) shows that in the case of coordinate compounds, both the skeletal and the bodily features are identical; only encyclopedic knowledge differs from one lexical item to the other. For example, both *scholar* and *athlete* have the skeleton [+material, dynamic ([_i])]. In addition, in the formal part of their body they share the same features, namely <animate>, <human>, and <function>. Co-indexation of the “R” arguments of these items and the compatibility of both the skeletal and bodily features allows for the complete identification of reference.

4.5.2.2 Subordinate compounds

Subordinate compounds are defined as compounds in which there is an argumental relation between the head and the non-head. Consider for example the compound *burrito assembler* (from Lieber, 2010b: 135):

(21) [+material ([_j])]	[+material, dynamic ([_i], [+dynamic ([_i], [_j])))]	
<i>burrito</i>	-er	<i>assemble</i>

This compound is formed as follows. The first step includes the derivation of the word *assembler*; *-er* has no semantic conditions with respect to the argument it co-indexes with and, as a result, the “R” argument of the affix co-indexes with the highest argument of the verb. The second step is the co-indexing of the “R” argument of *burrito* with the unindexed argument of the verb, that is, the internal argument. From this follows the object-oriented reading of the compound.

Subordination is also manifested in $[N N]_N$ compounds. It is usually assumed that any $[N N]_N$ compound which exhibits the ‘of’ relation between its members should be counted as subordinate (see for example the classification of Bisetto and Scalise, 2005; Scalise and Bisetto, 2009). The English *apple cake*, for example, is considered subordinate since it can be paraphrased as ‘cake of apple’. Ralli (2013: 102) also argues that the Greek compound *nixtopuli* in (22) is subordinate since it shows a head-complement relation:

- (22) *nixt-o-pul-i* < *nixt(a) pul(i)*
 night-LE-bird-Infl night bird
 ‘nightbird’

More specifically, Ralli argues that the possessive relation, that is, the ‘of’ relation, which holds between the compound members, classifies the compound as subordinate.

A lexical-semantic approach to the classification of compounds, however, allows one to propose that not all compounds in which the relation between the compound members can be paraphrased with ‘of’ should be classified as subordinate. Lieber (2009) entertains the idea that a compound such as *apple cake* should not be considered subordinate but attributive. In a similar vein, the Greek *nixtopuli* should not be a subordinate compound. Consider the lexical-semantic representation in (23).

- (23) *nixta* ‘night’ *puli* ‘bird’ SMG
 [–material ([_i])] [+material ([_i])]
 <feminine> <neuter>
 <–animate> <+animate>
 {dark period,...} {it has feathers and wings, it flies,...}

The above representation shows that the head of the formation, *puli* ‘bird’, has only one argument, namely the “R” argument. The non-head *nixta* ‘night’ has a single argument,

the “R” argument, as well. The compound is created by co-indexing the “R” arguments of the head and the non-head. A basic difference, however, between this compound and a subordinate compound such as *burito assembler* is that the skeleton of the head, *puli*, has only one argument and not two as in *assembler*. As a result, there is no head-complement relation between the head and the non-head in the compound *nixtopúli* simply because the head has no complement position. Based on this analysis, a subordinate Greek [N N]_N compound in which there is a head-complement relation is given below:

- (24) *athasia* ‘almond tree’ *fillo* ‘leaf’ Cypriot
- | | |
|-------------------------------|---|
| [+material ([_i]) | [+material ([], [OF ([_i])])] |
| <feminine> | <neuter> |
| <-animate> | <-animate> |
| {almond tree,...} | {a flat part of a plant or tree, green,...} |

Based on encyclopedic knowledge encoded in the last part of the representation, the “R” argument of the non-head, *athasiá* ‘almond tree’, is co-indexed with the ‘OF’ argument of the head *fillo*, hence the meaning ‘the leaf of the almond tree’. The difference between *nixtopúli* ‘nightbird’ and *athasófillo* ‘almond leaf’ is that only in the latter is there a true argumental relation between the head and the non-head since the “R” argument of the non-head is co-indexed with the ‘OF’ and not the “R” argument of the head.

4.5.2.3 Attributive compounds

In attributive compounds there is a modifier-modifée relation, in that the non-head modifies the head element. Characteristic examples are the English Adj. + Noun *blackboard*, *poorhouse*, the Greek *xazokóritso* (example taken from Ralli, 2013: 102), the Italiot *kitrinolóo*, and the Cypriot *asprómelon*:

- (25) a. *xaz-o-korits-o* < *xaz(o) korits(i)* SMG
 silly-LE-girl-Infl silly girl
 ‘silly girl’
- b. *kitrin-o-le-o* < *kitrin(o) le(o)* Italiot
 yellow-LE-merle-Infl yellow merle bird
 ‘merle bird with yellow plumage’

- c. *aspr-o-mel-on* < *aspr(on) mel(in)* Cypriot
 white-LE-honey-Infl white honey
 ‘white-coloured honey’ white honey

The conceptual structure of the Italiot *kitrinolóo* is given in (26):

- (26) *kitrino* ‘yellow’ *leo* ‘merle bird’
 [–dynamic, +scalar ([_i]) [+material ([_i)]
 <gender> <masculine>
 <colour> <+animate>
 {colour,...} {a kind of bird,...}

Following Ralli (2002), I assume that adjectives do not come with a specific gender value and that they are assigned the gender value of the noun they modify. Ralli argues that lexical items are distinguished into two types: (a) items which have a fully specified gender feature (i.e. a feature which has an attribute with a specific value) and (b) items with an underspecified gender feature (i.e. a feature which has an attribute without a value). Adjectives belong to the second type of lexical items and according to Ralli they acquire a specific gender value by syntactic agreement.

In addition to Adj. + Noun compounds, attribution manifests itself in [N N]_N compounds in which the non-head modifies the head as exemplified by the Cypriot *ammóvunos*:

- (27) *amm-o-vun-os* < *amm(os) vun(o)*
 sand-LE-mountain-Infl sand mountain
 ‘sand dune’

This last example would count as a subordinate compound based on the traditional classification of compounds since the relation between the compound members could be paraphrased with ‘of’ (‘a mountain of sand’), but based on the present analysis, *ammóvunos* is an attributive compound since its head *vunó* ‘mountain’ has only one argument which is co-indexed with the “R” argument of the non-head. Therefore there is no head-complement relation in this compound and, as such, this compound should not be classified as subordinate.

4.6 The head in Lexical Semantics

The application of various assumed headship criteria in Chapter 3 showed that the head in morphology should be identified with the *category determinant*. It was also argued that the definition of “semantic head” on the basis of the hyponymy test should rather be reconsidered for the hyponymy test fails in several cases, yields contradictory results, and forces one to attribute different properties to the head of the same word when the latter has two or more meanings. In this section, I delve more deeply into the study of headship in lexical semantics and raise the question whether hyponymy applies to the lexical-semantic representation of a word as a whole or whether it relates only some parts of the representation of lexical items.

4.6.1 What is hyponymy?

Hyponymy is the ‘kind/sort/type of’ semantic relation among words. By way of example, *cow* is a hyponym of *mammal*, in that cows are a certain ‘kind of’ mammals. Contrary to semantic relations such as *synonymy* and *antonymy*, *hyponymy* is asymmetrical and hierarchical. In more detail, the relation which holds between *cow* and *mammal* (*cow* < *mammal*) is not the same as the relation between *mammal* and *cow* (*mammal* > *cow*); *cow* is a hyponym of *mammal*, and *mammal* is a hyperonym of *cow*. On the contrary, *synonymy* is a symmetric and non-hierarchical relation. That is, *divan* has the same relation to *couch*, as *couch* has to *divan* (*divan* = *couch*).

A pervasive issue in the study of semantics is whether hyponymy should be considered (a) a lexical relation or (b) a semantic relation among the meanings of words. The former renders hyponymy a relation between words and, as a result, hyponymy should be considered important for lexical organization. On the contrary, the latter shows that hyponymy is just a relation among the things lexical items describe and, as a result, it should not be represented in the lexicon. In other words, relations of *hyponymy* and *hyperonymy* are available as part of our knowledge of the world, and should not be part of the organization of the lexicon (for a discussion see Murphy, 2003, 2006).

The study of hyponymy with respect to the Morphology-Lexical Semantics interface is of paramount importance since the hyponymy test is used by scholars for the identification of the so-called *semantic head* of the word. In this respect, the semantic head

of *door knob* is *knob*, since the whole compound is a ‘kind of’ *knob* (*knob* > *door knob*) (Bloomfield, 1933; Allen, 1978). The way hyponymy works in morphology, however, (with the exception of Bauer, 1990) has not been studied in any detail. This is mainly due to the fact that a lexical-semantic framework which would allow one to conduct such a research has been lacking.

As presented in Chapter 3, the application of the hyponymy test to morphological configurations is not without problems and this test is not particularly useful in the case of affixation. In what follows, I enquire into the use of hyponymy with respect to simplex and complex morphological configurations.

4.6.2 Hyponymy in simplex lexical items

To begin with, let us examine how hyponymy relates simplex lexical items since the relations which hold between simplex items are also evident in the relation among complex items (Lieber, 2004). (28) gives the semantic representation of the words *flower* and *rose* which are in a relation of *hyponymy*; *rose* is a ‘kind of’ *flower*. The question to be addressed is whether the ‘kind of’ relation holds between (a) the skeleton and the body of *rose* and *flower*, (b) the skeleton alone, or (c) the body alone:

- (28) a. flower [+material ([])]
 <-animate>
 <function>
 {a bloom or blossom on a plant,...}
- b. rose [+material ([])]
 <-animate>
 <function>
 {the flower of any of the plants of the genus *Rosa*,
 a fragrant flower,...}

In this example, we observe that both lexical items have the same skeletal features, i.e. both are [+material], but different bodily information. Given that hyponymy is an asymmetrical relation, it is not accurate to claim that it relates the skeletal parts of *flower* and *rose*, since both items have identical skeletons. Rather, it seems that the relation of hyponymy holds between the bodies of the two items and not the skeletons. That is,

based on the information {the flower of any of the plants of the genus *Rosa*, a fragrant flower,...}, *rose* is considered a hyponym of *flower*.

One could argue that we could take hyponymy a bit more loosely and claim that *rose* is a ‘kind of’ [+material], just as *flower* is. This would force us to accept that hyponymy is not a hierarchical and asymmetrical relation since the relation (if any) between the skeletons of the two words is the same. In particular, the two skeletons are in a symmetrical relation since the skeleton of *flower* has the same relation to the skeleton of *rose*, as the skeleton of *rose* has to the skeleton of *flower*. On the contrary, the relation which holds between the body of *flower* and the body of *rose* (*flower*>*rose*) is not the same as the relation between the body of *rose* and the body of *flower* (*rose*<*flower*). The foregoing discussion strongly suggests to me that the relations of hyponymy and hyperonymy can only be established between the bodies of *rose* and *flower*. Categorical information seems to be irrelevant to hyponymic and hyperonymic relations.

Second, research has shown that hyponymy is a relation which can also hold between members of distinct lexical categories (Lyons, 1977). By way of example, adjectives such as *sweet/bitter* and *happy/sad* can serve as hyponyms of nouns, namely *taste* and *emotion* respectively. Consider the lexical-semantic representation of *emotion* and *happy* in (29):

- (29) a. emotion [–material, dynamic ([])]
 <–animate>
 {a mental state that arises spontaneously
 rather than through conscious effort,
 it is often accompanied by physiological changes,...}
- b. happy [–dynamic, +scalar ([])]
 <...>
 {an emotion, a feeling, showing, or expressing joy,...}

As evident from (29), the relation of hyponymy holds between the bodies of *emotion* and *happy* since the latter bears the information {an emotion, a feeling, showing, or expressing joy,...} in its body. On the contrary, no relation of hyponymy or hyperonymy can be established between the skeletons of these lexical items. In fact, the skeletons of *emotion* and *happy* are in no relation either symmetrical or asymmetrical.

Third, a number of countable nouns may be in a relation of hyponymy with other uncountable nouns. The noun *chair*, for example, is a hyponym of *furniture* which is an uncountable noun. Other examples include, *cutlery*>*knife*, *clothing*>*shirt* etc. Consider the semantic representation of *furniture* and *chair* in (30):³

- (30) a. furniture [+material, -B, -CI ([])]
 <+artifact>
 <function>
 {the movable articles in a room or an establishment
 that make it fit for living or working,...}
- b. chair [+material, +B, -CI ([])]
 <+artifact>
 <function>
 {a piece of furniture consisting of a seat, legs, back,
 and often arms,...}

The relation of hyponymy between *furniture* and *chair* is established between the bodies and not the skeletons of the two words. That is, the information {a piece of furniture...} which is encoded in the encyclopedic part of the body of *chair* derives the relation of hyponymy *chair*<*furniture*. No hierarchic and asymmetrical relation can be established if we take into consideration the fact that *furniture* is a mass noun and *chair* a singular count noun.

The way hyponymy relates simplex lexical items shows that the relations of *hyponymy* and *hyperonymy* are only established between the bodies of two lexical items. The information encoded in the skeletal part is not relevant to whether two words are in a relation of hyponymy or hyperonymy. This is in accordance with the claim that the relation of hyponymy is available as part of our knowledge of the world. In the framework developed by Lieber (2004), this information is part of the body and not the skeleton of a lexical item. In fact, it is encoded in the second, encyclopedic part of the body.

This conclusion corroborates the idea that there is a difference between the grammatical skeleton in which the ontological class of an item is encoded, and the pragmatic

³On the use of the features [B] (Bounded) and [CI] (Composed of Individuals) see Section 4.8.1.

Body. Finally, the way hyponymy works in simplex items casts serious doubts on the validity of the hyponymy test as a diagnostic for the identification of the *semantic head* of the word.

4.6.3 Hyponymy in complex morphological configurations

In what follows, I focus on the way hyponymy functions in complex morphological configurations; I comment on derivation in Section 4.6.3.1 and I deal with compounding and prefixation in Section 4.6.3.2.

4.6.3.1 Hyponymy in derivation

Our discussion of the various head-like notions in Chapter 3, has shown that it is particularly difficult to apply the hyponymy test to affixed words. The category-changing transpositional affixes, for example, clearly fail the hyponymy test. By way of example, the word *istorikós* ‘historical’ is certainly not a hyponym of its base, i.e. *istoría* ‘history’, or its suffix *-ikos*. In addition, we concluded that the application of the hyponymy test to prefixed words is also very difficult and that it yields unclear results.

It is the contention of the present thesis that a closer inspection of the lexical-semantic representation of affixes can account for the fact that the hyponymy test is not particularly useful in affixation. First, as presented in Section 4.4, not all lexical items have the same structure in their lexical-semantic representation. Simplex words for example have (a) a skeleton, (b) a (first) partly formalizable body, and (c) a (second) layer of body which consists of encyclopedic and other semantic aspects. On the contrary, affixes in most cases have no (or very little) body. Second, as argued for in the previous section, hyponymy is a relation which holds between the bodies of two lexical items. These two observations combined can account for the fact that hyponymy does not apply to affixation. That is, it follows from the nature of hyponymy and hyperonymy that the hyponymy test cannot apply to affixation for affixes have no bodily information.

4.6.3.2 Hyponymy in compounding and prefixation

The application of the hyponymy test to compounds is of particular importance since a number of theoretical approaches have been proposed in order to deal with the issue

of *headed* and *headless* compounds.⁴ To anticipate later discussion, Bauer (2010: 167) argues that headless compounds can fail the hyponymy test in three ways: (a) they can fail to display a head element, (b) they can function as a member of word-class which is not the word-class of their head element, and (c) they can have a head element of the correct word-class, but with apparently the wrong denotation. Our discussion on hyponymy, however, shows that Bauer's claims should be reassessed because the word-class of an element is irrelevant to the hyponymy test. That is, the hyponymy test applies to the body and not to the skeleton.

According to the 'ISA' condition proposed by Allen (1978), a compound as a whole is a hyponym of its (semantic) head element. For example, *door knob* is a hyponym of *knob* which is the semantic head of the compound. On the contrary, when the hyponymy test fails to identify a head element, the compound is rendered semantically headless. The compound *redhead*, for example is not a 'kind of' *head* but a 'kind of' 'a person with red hair', and is, therefore, considered semantically headless. The question which arises is whether the hyponymy test applies to (a) the skeleton alone, (b) the body alone, or (c) both the skeleton and the body of a compound.

In order to answer this question, I will present and analyze a number of headed and headless compounds. Consider for example the Cypriot compound *agrioeiá* 'wild olive tree'. The head based on the hyponymy test is *eiá* since the whole is a hyponym of *eiá* 'olive tree'. The lexical-semantic representation of this compound is given in (31):

(31) *agrioeiá* 'wild olive-tree'

<i>agriá</i> 'wild'	<i>eiá</i> 'olive-tree'
[−dynamic, +scalar ([_i])]	[+material ([_i])]
<gender>	<feminine>
	<function>
{growing or produced without cultivation or the care of humans,...}	{a plant having a woody main stem, and branches, its fruit is olive,...}

The question to be answered is the following: Which parts of *eiá* 'olive tree' and *agrioeiá* 'wild olive tree' does hyponymy relate (so that *agrioeiá* is a hyponym of *eiá* and

⁴In order to avoid confusion, I will not use the terms *endocentric* and *exocentric* until Part IV of the present thesis.

eliá a hyperonym of *agriieliá*)? As we observe from (31), no hierarchic and asymmetrical relation can be established if we take into consideration the fact that *agriieliá* and *eliá* belong to the major ontological class of SUBSTANCES/THINGS/ESSENCES.

A closer inspection of the lexical-semantic representation of the compound *agriieliá* reveals that the hyponymy test applies to the body and not to the skeleton. In fact, the hyponymy test applies to the part of the body which comprises those aspects of meaning that are perceptual, cultural, and encyclopedic. In more detail, *agriieliá* is a kind of *eliá*, that is, it denotes {a plant having a woody main stem and branches, its fruit is olive,...}. More specifically, *agriieliá* is a kind of {a plant having a woody main stem and branches, its fruit is olive,...} which {grows without cultivation or the care of humans,...}. This is in accordance with our conclusion with respect to hyponymy in simplex lexical items, in that skeletal features are not relevant to hyponymic relations.

That the hyponymy test applies to the body and not to the skeleton can account for the fact that compounds which exhibit a figurative meaning fail the hyponymy test and are rendered headless.⁵ Consider, first, the metaphorical Italiot compound *lagudáthti* and the SMG *tavanóskupa* in (32):

- (32) *lagud-atht-i* < *lagud(i) atht(i)* Italiot
 rabbit-ear-Infl rabbit ear
 ‘lit. ear of a rabbit, metaph. type of plant with large leaves’
- tavan-o-skup-a* < *tavan(i) skup(a)* SMG
 ceiling-LE-broom-Infl ceiling broom
 ‘lit. broom for cleaning the ceiling, metaph. a very tall person’

These compounds are rendered headless because the whole is not a hyponym of either of their constituents, that is, their meaning matches none of the bodies of the compound members. In particular, *lagudáthti* denotes a *plant* and not an *ear* or a *rabbit* and *tavanóskupa* metaphorically denotes a *person* and not a *broom*.

Consider now the English *redhead* in (33):

⁵For a detailed analysis of *metaphorical* and *metonymical* compounds see Chapter 7.

(33) <i>red</i>	<i>head</i>
[-dynamic, +scalar ([_i])]	[+material ([_i])]
<...>	<function>
{a color,...}	{the uppermost part of the body,...}

The analysis of this compound is particularly useful to our study, since the hyponymy test renders this compound headless. That is, *redhead* is not a hyponym of *head*. The question to be answered is the following: Why is *redhead* headless? Is it a matter of the skeleton or the body?

Based on the foregoing discussion, no hyponymic relation can be established between the skeletons of *head* and *redhead*. The information encoded in the skeletal parts of *head* and *redhead* is totally irrelevant to whether a relation of hyponymy can be established between *head* and the compound as a whole. On the contrary, it seems safe to suggest that this compound is considered headless because no hyponymic relation can be established between the body of *head* and the body of the whole compound which metonymically denotes a person. That is, *redhead* is a ‘kind of’ *person* and not a ‘kind of’ *head*.

Consider also the compound *hard hat* (from Lieber, 2009: 69). This compound can be both headed and headless depending on whether it denotes a ‘kind of’ *hat* (helmet) or a ‘kind of’ *person* (worker). Of importance to our question, is the fact that whether *hard hat* is headed or not, depends on whether a relation of hyponymy can be established between the body of *hat* and the body of the compound as a whole. Once again, we observe that the hyponymy test does not apply to the skeleton; whether *hard hat* is semantically headed (based on the hyponymy test) or headless, is not a matter of the skeleton, since there is no change in the ontological class of the compound in any case.

Another issue relates to configurations in which an *anti-intersection* adjective, that is, an adjective which requires negation of the noun with which it combines, modifies a noun. Consider the Greek noun *psevd-o-profiti-s* ‘false-LE-prophet-Infl’ which is composed of the adjective *psevd*-⁶ ‘fake, false, phony’ and the noun *profiti-s* ‘prophet’. In order to decide whether *psevdoprofiti-s* is headed or not, we have to answer whether it is a ‘kind of’ *prophet*. A useful test is the ‘*X and other Y*’ test (Cruse, 1986) according to which X is a hyponym of Y. For instance, the sentence in (34) shows that *dog* is a

⁶Whether *psevd-* has acquired the status of *prefixoid* is orthogonal to my argumentation.

hyponym of *animal*.

(34) Dogs and other animals.

Let us apply this test to *pseudoprofitis* ‘false prophet’ and *agrioliá* ‘wild olive tree’:

(35) a. *Sto xoráfi mu exo fitépsi agrioliés ke álles eliés.*

‘In my field I have planted wild_olive_trees and other olive_trees.’

b. *Gnorízo arketís pseudoprofites ke állus profites.*

‘I know a lot of false_prophets and other prophets.’

Although (35a) sounds normal, (35b) sounds odd; *agrioliá* is a ‘kind of’ *eliá*, but *pseudoprofitis* is not a *profitis*. One could of course disagree with me on this issue, but of relevance to our examination of hyponymy is the fact that whether *pseudoprofitis* fails the hyponymy test or not, is not a matter of the information encoded in the skeleton since both *profitis* and *pseudoprofitis* are SUBSTANCES/THINGS/ESSENCES. On the contrary, the semantic headedness of this formation is to be decided based on whether a relation of hyponymy can be established between the body of the word *pseudoprofitis* ‘false prophet’ and the body of the word *profitis* ‘prophet’.

A similar problem arises in the case of denominal derivatives with the prefix *anti-*. These words are nouns which denote ‘the opposite of X’. Consider the words in (36):

(36) *anti-fasístas* ‘anti-fascist’

anti-íroas ‘anti-hero’

The hyponymy test fails to identify the semantic head of these formations since *anti-fasístas* is not a *fascist* and *anti-íroas* is not a *hero*. On the contrary, the words in (36) denote the exact opposite of the noun which serves as the category determinant.

Another argument in favour of the proposal that the hyponymy test relates the bodies and not the skeletons of two lexical items comes from the distinction between *taxonomic* and *functional* hyponymy (Miller, 1998). A *dog*, for example, can be a taxonomic hyponym of *animal* and a functional hyponym of *pet* since a dog can function as a pet. Consider now the compound *baseball bat* (Murphy, 2003). This formation can be a ‘kind of’ *bat*, but also a ‘kind of’ *weapon* (functional hyponymy). Of relevance to our study is the fact that the distinction between taxonomic and functional hyponymy is not

encoded into the skeleton of an item. On the contrary, it is a matter of the body alone. It is a matter of our knowledge of the world that *baseball bat* and *dog* are functional hyponyms of *weapon* and *pet* respectively.

4.6.4 Head as part of the Skeleton

The analysis of simplex and complex words has shown that hyponymy is a relation which holds between the bodies of two lexical items and not their skeletons. We saw, for example, that a relation of hyponymy can be established between members of distinct categories (e.g. *emotion*>*happy/sad*) and countable and uncountable nouns (e.g. *cutlery*>*knife*). In addition, I argued that no asymmetrical and hierarchical relation can be established between the ontological class of two lexical items or the ontological class of a compound and its head. This proposal is in accordance with the view that hyponymy is a relation among the things lexical items describe and that it is available as part of our knowledge of the world. This conclusion casts serious doubts on the usefulness of the hyponymy test with respect to the identification of head, since several arguably headed formations (consider for example *antifasistas* and metaphorical compounds) are rendered headless by the hyponymy test.

In order to solve these issues I propose that the head for the purposes of Lexical Semantics should not be a matter of the body and that we should search for the head in the grammatical skeletal part of the lexical-semantic representation.

First, let us comment on derivation. The identification of head in terms of the semantic features of the skeleton can solve the issue of whether words such as *istorikós* ‘historical’ are headed or headless; remember that the hyponymy test renders words such as *istorikós* headless. Consider, however, the following:

(37) *-ikos*

[−dynamic, +scalar ([], <base>)]

(38) *istoría* ‘history’

[−material ([], [])]

(39) *istorikós* ‘historical’

[−dynamic, +scalar ([_i], [−material ([_i], [])])]

The above representations allow one to propose that *istorikós* is not headless as the hyponymy test indicates, but that it is headed by the affix *-ik(os)*; *istorikós* denotes the class of its head *-ik(os)*, and this property is not related with either hyponymy or hyperonymy.

Consider now negative prefixes such as *anti-*. Based on the work of Lieber (2004), the word *antifasístas* should be attributed the conceptual structure in (40):

- (40) *anti-fasístas* ‘anti-fascist’
 [–Loc ([+material, dynamic ([])]
anti- fasístas

According to the representation in (40), the prefix *anti-* imposes a negative part of meaning (i.e. –Loc) on the skeleton of the noun *fasístas*.⁷ Instead of proposing that this formation is headless, we can maintain that *antifasístas* is headed by the noun *fasístas* since failure of the hyponymy test to identify the hyperonym should not render a formation headless.

Let us now turn to the inspection of compounds such as the Cypriot *aeropínno*:

- (41) *aer-o-pinn-o* < *aer(as) pinn(o)*
 air-LE-drink-Infl air to drink
 ‘to waste time, to build on sand’

Based on the hyponymy test, this compound is headless since the whole does not denote the meaning ‘to drink’. If we, nevertheless, part company with previous analyses and search for the head in the skeleton and not in the body, a different picture emerges. Consider the representation of *aeropínno* below:

- (42) *aeropínno* ‘to waste time, to build on sand’
aeras ‘air’ *pinno* ‘drink’
 [+material ([_i]) [+dynamic ([], [_i])
 <–animate> <manner>
 {gaseous mixture, ...} {to swallow something, ...}

⁷The careful reader may have noticed that the skeleton in (40) shows that [Loc] is deprived of arguments. For more on this issue see Section 4.7.

Based on the representation in (42), it could be argued that *aeropinno* is headed by *pinno* which is a [+dynamic] SITUATION since the semantic head should not be a matter of the body. The fact that this compound does not denote a ‘type of’ *pinno* ‘to drink’ should not be attributed to the head-nonhead asymmetry, but to semantic drift.

Consider also words which have two or even more meanings; a compositional and a figurative one. Such a word is the Cypriot compound *aggurósporos* and the formation *ampelógattos* from Cephalonia in (43):

- (43) *aggur-o-spor-os* < *aggur(i) spor(os)*
 cucumber-LE-seed-Infl cucumber seed
 1. ‘cucumber seed’ 2. metaph. ‘a worthless person’
- ampel-o-gatt-os* < *ampel(i) gatt(os)* Cephalonia
 vineyard-LE-cat-Infl vineyard cat
 1. ‘cat which feeds itself at vineyards’ 2. metaph. ‘malformed person’

If we base the identification of head on the hyponymy test, we are forced to accept two radically different and contradictory analyses of headship for these compounds. Consider the Cypriot compound. On the one hand, based on the reading ‘cucumber seed’, it is headed by its second constituent since the bodily part of the whole is the same with the body of *spóros* ‘seed’. On the other hand, an analysis based on the second figurative reading forces one to propose that the same compound is headless since the body of the whole and the body of the constituent *spóros* are not the same (see Section 3.3.2). If we however, base our analysis on the current proposal, the compound *aggurósporos* has a head, namely *spóros*, and it is not headless in either case. The difference between the first and the second reading should not be attributed to the presence or absence of head but to the use of the compound with a figurative meaning.

To sum up, in this section I proposed that the identification of the semantic head of a morphological configuration based on the rather simplistic hyponymy test should be reconsidered since this test fails to identify the head of a formation in several cases. Based on the analysis of simplex and complex lexical items I showed that the hyponymy test applies to the second layer of the body of an item (pragmatic part) and not to the formal part of it, which is the skeleton (grammatical part). As a result, a number of formations are rendered headless since the body of a lexical item, contrary to its skeleton,

may undergo semantic drift and lexicalization.

In addition, not all items have a body (e.g. affixes) and this leads to the rather awkward conclusion that affixed words should be considered headless. In fact, we saw in Chapter 3 that it is very difficult to apply the hyponymy test to derived words (suffixed or prefixed). The main proposal of this section was that the head should be a matter of the skeleton and not the body and that the head for the purposes of Lexical Semantics should be identified with the *ontological class determinant*. This is in accordance with the conclusion of the previous chapter that the head in morphology is the *category determinant*. As we will see in Part IV of the present thesis, this conclusion is further corroborated by the distinction between endocentric and exocentric compounds.

4.7 Subordination of functions without indexation

As we presented in the previous sections, a word may be created by subordination (44) or concatenation (45) of functions as illustrated below:

(44) $[\alpha F_1 ([], [\beta F_2 ([])])]$

(45) $[\alpha F_1 ([])] [\beta F_2 ([])]$

Given that derivational affixes such as *-er* add their skeletal material as the outermost function in the skeleton of a base, affixation involves subordination of functions as schematically shown in (44). Compounds are formed by concatenation of functions as illustrated in (45). A closer inspection of the two schemata reveals that derivation and compounding are accounted for by the mechanism of co-indexation. The items which participate in these schemata are all argument-bearing and, as a result, the principle of co-indexation is needed in order to co-index their arguments.

As far as the head in these schemata is concerned, our conclusion that the head is the *ontological class determinant* means that the head for the purposes of subordination of functions is the affix, i.e. αF_1 , and the non-head is the base, i.e. βF_2 . With respect to the concatenation of functions, the head is identified with βF_2 , whereas the non-head is αF_1 .

In Chapter 3, nevertheless, we argued that not all affixes should be considered heads of their formations (e.g. prefixes). In what follows, I elaborate upon the way the head-nonhead asymmetry could be accounted for in Lexical Semantics focusing on those

cases in which the affix is the non-head of the formation; Section 4.7.1 briefly comments on inflection, Section 4.7.2 provides an analysis of prefixation, and Section 4.7.3 discusses Greek evaluative morphology.

4.7.1 Inflection

According to Lieber (2004), the lexical-semantic representation of inflectional affixes consists of a skeleton (but not a body). Consider the following skeleton for the plural suffix *-s* (from Lieber, 2004: 151):

- (46) *-s*
 [–B, +CI (<base>)]

This lexical-semantic representation informs us that *-s* bears the quantity features [–B] (B stands for Bounded) and [+CI] (CI stands for Composed of Individuals) and that, as an affix, *-s* attaches to a base and adds its skeletal features to that base. A closer inspection of the representation in (46) reveals that there is a basic difference between the representation of an inflectional suffix such as *-s* and a derivational suffix such as *-er*. In (47) I repeat the lexical-semantic representation of *-er*:

- (47) *-er*
 [+material, dynamic ([], <base>)]

A comparison of the skeletons of *-s* and *-er* shows that the former has no argument, whereas the latter bears an “R” argument. As argued for by Lieber (2004), *-s* should not come with an argument position since it cannot change the reference of the base it attaches to.

Our conclusion that the head in Lexical Semantics should be the element which serves as the *ontological class determinant* is in accordance with Lieber’s analysis since inflectional affixes cannot change the ontological class the whole belongs to. Consider, for example, the plural form of the word *chair*:

- (48) *chairs*
 [–B, +CI ([+material ([])))]
-s *chair*

Based on the representation in (48), *-s* subordinates the skeleton of the base word, *chair*, and adds its quantity features $[-B, +CI]$ to it.⁸ As far as the head-nonhead distinction is concerned, it follows from this representation that the head of the formation is the base and not the suffix since the ontological class the whole belongs to is determined by *chair* and not by the suffix *-s*; the word *chairs* is a $[+material]$ noun, as its head *chair* is.

The fact that *-s* has no argument in its skeleton means that co-indexation does not apply in this case. As presented in Section 4.5, the mechanism of co-indexation proceeds on the argument(s) of the head and the non-head, but given that *-s* has no argument, co-indexation does not apply.

In my opinion, the foregoing discussion strongly suggests that subordination of functions could be split into two sub-schemata as illustrated below:

(49) Subordination of Functions

a. $[\alpha F_1 ([\], [\beta F_2 ([\])])]$

b. $[\alpha F_1 ([\beta F_2 ([\])])]$

The difference between the two schemata is that in (49a), the affix bears an argument, whereas the affix in (49b) has no argument position. Consequently, the former schema represents the subordination of functions with co-indexing of arguments, whereas the latter schema illustrates the subordination of functions without co-indexing of arguments. I would argue that another difference between the two schemata is the way they capture the head-nonhead asymmetry since the head (i.e. the *ontological class determinant*) in (49a) is the affix, whereas in (49b), the affix is the non-head (and the base is of course the head).

In the following sections, I delve more deeply into the difference between subordination of functions with and without indexing of arguments. Section 4.7.2 discusses English prefixation and Section 4.7.3 focuses on Greek evaluative morphology.

4.7.2 Prefixation

In this section, I focus on the analysis of two prefixes, namely (a) *dis-*, (b) *re-* since these prefixes allow one to enquire into the difference between subordination of functions with and without indexing of arguments.

⁸See Section 4.8 for a more detailed account of plural.

4.7.2.1 *dis-*

The prefix *dis-* attaches to adjectives (*disloyal*), nouns (*discomfort*), and verbs (*dislike*).

(50) a. Adjectives:

discourteous, disloyal, disengaged

b. Nouns:

discomfort, disrespect

c. Verbs:

dislike, disobey, disrobe

On purely morphological grounds, this means that *dis-* has no categorial features, that is, it is category-less. It follows from this lack of categorial features that *dis-* cannot act as a head since it cannot change the category of the base it attaches to; the category of the prefixed word is decided by the base which serves as the head of the formation.

With respect to Lexical Semantics, Lieber (2004: 115) provides the following skeleton for *dis-*:

(51) *dis-*

[–Loc ([], <base>)]

Based on the lexical-semantic representation in (51), *dis-* as a negative prefix is characterized by the feature [–Loc] (Loc stands for Location). In addition, of importance to our discussion is the fact that *dis-* bears an argument in its skeleton.

A comparison between the skeleton in (51) and the schemata in (49) which represent the creation of a skeleton by subordination of functions, shows that *dis-* belongs to (49a), that is, subordination of functions with indexing of arguments. In fact there is no difference between the formal mechanism by which a derivational suffix such as *-er* and *dis-* combine with other constituents; both affixes are argument bearing and as a result the principle of co-indexation applies in order to co-index their arguments with the arguments of the bases they attach to.

In my opinion, the lexical-semantic representation of *dis-* should be revised. To begin with, according to Lieber (2004), arguments are characteristic of the major ontological classes. We saw for example that *-er* bears an “R” argument since this particular

affix is specified as N(oun). The prefix *dis-*, however, has no categorial features of its own and, consequently, belongs to no major ontological class. As a result, *dis-* should not be attributed an argument position. In addition, as we saw in Section 4.7.1, inflectional affixes do not bear an argument simply because they cannot alter the reference of the base they attach to, but it is not clear whether *dis-* behaves in a different manner.

In my opinion, the formal distinction between the subordination of functions with and without subordination, also indicates that *dis-* should be deprived of any arguments. By way of example, consider the derivation of the prefixed verb *disarrange*:

(52) *dis-*

[–Loc ([], <base>)]

(53) *arrange*

[+dynamic ([], [])]

(54) *disarrange*

[–Loc ([_i], [+dynamic ([_i], [])))]

If we try to apply the Principle of Co-indexation as schematically illustrated in (54), a problem arises. Co-indexation proceeds on the arguments of the head and the non-head, but in this case it is not clear which constituent is the head, since the skeleton of *dis-* and the assumption that prefixes are not heads derive contradictory results as to the identification of head. More analytically, the skeleton for *dis-* in (52) argues that the prefix is the head since based on the way it is being formalized, the skeleton of *dis-* subordinates that of the base, *arrange*, in the same way *-er* does. To put it bluntly, both affixes create skeletons by subordination of functions with indexation of arguments.

Another problem is that the mechanism of co-indexation cannot derive the correct meaning. This mechanism dictates that the arguments of the head and the non-head be co-indexed. Given that *arrange* has two arguments, the argument of *dis-* must be co-indexed with one of them. This, however, is highly problematic since the argument of *dis-* is not compatible with either the internal or the external argument of the verb. Even if we accept that co-indexation is a violable principle, we still cannot explain the fact that *dis-* adds a negative meaning to *arrange*. On the assumption that co-indexation can be violated, the argument of *dis-* gets co-indexed with the external argument of the verb, as illustrated in (54). This, however, does not derive the desired meaning.

In order to solve these issues I propose that the lexical-semantic representation of *dis-* should be revised as in (55):

- (55) *dis-*
 [–Loc (<base>)]

The difference between this skeleton and the skeleton in (51) is that in (55), *dis-* has no argument position. As a result, prefixation of *dis-* should be accounted for by subordination of functions without indexation of arguments. Consider, for example, the prefixed word *disarrange*:

- (56) *disarrange*
 [–Loc ([+dynamic ([], [])])]
dis- arrange

As evident from the skeleton in (56), the mechanism of co-indexation does not apply because *dis-* has no argument position. In addition, the head of the word is the verb *arrange* since it acts as an *ontological class determinant*. Based on this skeleton, *dis-* subordinates the base skeleton and, as a negative affix, adds a nonlocation component of meaning to the base word, *arrange*.

4.7.2.2 *re-*

Prefixation of *re-*, which indicates a repeated action, is another example of affixation which should be accounted for by subordination of functions without indexation. Lieber (2007: 270) argues that *re-* which is added to verbs, has the following lexical-semantic representation:

- (57) *re-*
 [+CI ([], <[+dynamic, –CI, +IEPS (...), [Path. State: stage level]])>)]

According to the skeleton in (57), *re-* attaches to eventive verbs which imply a path or a result which is reversible and it imposes via subordination its skeletal feature, [+CI], to the base. Observe that based on this skeletal representation, prefixation of *re-* should be accounted for by subordination of functions with indexing of arguments, since *re-* has an argument.

Based on the same arguments presented in the previous section with respect to the prefix *dis-*, I am of the opinion that *re-* should not bear an argument position. As a result, the mechanism of co-indexation should not apply to *re-* prefixation. I, therefore, propose that the lexical-semantic representation of *re-* should be reformulated as in (58):

- (58) *re-*
 [+CI (<base>)]

Consider for example the derivation of the prefixed verb *rebuild*:

- (59) *rebuild*
 [+CI ([+dynamic ([], [])])]
re- build

In this example, the co-indexation mechanism does not apply since *re-* has no argument and, in addition, the ontological class comes from the verb *build* which is the head of the word. Observe also that both arguments of the verb are free to be discharged in syntax since *re-* has no argument which could be co-indexed with the internal or the external argument of the verb.

So far we have presented words in which the skeletal features of the affix can be added to the skeleton of the base by subordination of functions without indexation. We have seen, for example, that *dis-* can add the semantic feature [–Loc] to the base, as in *dissarange*. In a similar vein, Lieber (2004: 147) argues about the prefix *re-* that: “*re-* adds the feature [+CI] to the skeleton of its verbal base”.

Subordination without indexation, I would argue, can also account for the change of the value of the features of the head. In such cases, the affix can override the positive or negative value of a semantic feature of the base in the following way: When the head and the non-head are specified for the same feature but have contradictory values for the feature in question, the feature of the non-head can change the value of the feature of the head. Consider for example the prefixed verb *reassure*:

- (60) *re-*
 [+CI (<base>)]

(61) *assure*

[+dynamic, -CI ([], [])]

(62) *reassure*

[+CI ([+dynamic, -CI ([], [])))]

In this example, the head, i.e. the verb *assure*, is characterized by (at least) the features [+dynamic, -CI] and two arguments. Of importance to our study of subordination of functions is the presence of the feature [CI] with a negative value in the skeleton of the verb and a positive value in the skeleton of the prefix *re-*. Based on the formal mechanism of subordination without indexation, the affix, in this case the prefix *re-*, can change the <-> value of the [CI] feature of the verb, into [+CI]. From this follows the iterative meaning 'to do again' of the prefixed verb.

4.7.3 Evaluative morphology

Our conclusion that the head should be identified with the *ontological class determinant* is challenged by the analysis of Melissaropoulou and Ralli (2008) who claim that Greek diminutive suffixes are heads despite the fact that they have no categorial features.

Whether evaluative affixes are inflectional or derivational and whether they are heads of their formations have been hotly debated and no consensus has been reached. Anderson (1992), for example, uses data from languages such as Fula and Kikuyu and argues that these affixes should be considered inflectional since they exhibit properties which are characteristic of inflection, e.g. they are very productive. Scholars such as Dressler and Merlini-Barbatesi (1994) and Scalise (1988) also argue that evaluative affixes are not prototypical instances of derivational affixes. Scalise (1988), for example, entertains the idea that evaluative affixes have a special status and that they are situated between derivational and inflectional affixes:

(63) Derivational suffixes → Evaluative suffixes → Inflectional suffixes

According to Scalise (1988), these affixes have no categorial specification and they do not obey the Unitary Base Hypothesis (Aronoff, 1976). Consider the following:

(64) [tavolo]_N + ino]_N 'table - little table'

[giallo]_A + ino]_A 'yellow - yellowish'

[bene]_{Adv} + ino]_{Adv} ‘good - quite good’

These examples indicate that the affix *-ino* can be added to nouns, adjectives, and adverbs, without altering the category of the base; inflectional affixes do not affect the category of the base either. In addition, *-ino* violates the Unitary Base Hypothesis since it can combine with bases of different categories.

Another characteristic of evaluative affixes is that they are external with respect to derivational affixes, but internal with respect to inflectional ones. Consider the word *contrabbandierucoli* ‘little smugglers’ from Scalise (1988: 235):

(65) *contrabbando* + Der. Suff. *ieri* + Evaluative Suff. *ucolo* + Infl Suff. *i*

Finally, Scalise (1988) argues that evaluative affixes are not heads of their formations since they cannot change the category or the lexical representation of the base they combine with.

That evaluative affixes are category-less is also evident in Greek evaluative morphology. The Griko *-uddhi* and the Aivaliot *-el’*, for example, can attach to both nouns and adjectives without affecting the category of the base. Consider the following from Melissaropoulou and Ralli (2008):

(66) a. *-uddhi*

aderf-uddhi < aderf(o)

little brother.N brother.N

ftex-uddhi < ftex(o)

little poor.A poor.A

b. *-el’*

purt-el’ < port(a)

little door.N door.N

umurf-el’ < omurf(u)

little beautiful.A beautiful.A

Despite the fact that these affixes have no categorial features, Melissaropoulou and Ralli (2008), nevertheless, argue that evaluative suffixes should be considered heads. In more detail, they argue that in order to examine whether these affixes could serve as heads, we should first deal with whether these affixes are derivational or inflectional. Their

argument is the following: if we can show that evaluative suffixes are derivational, then these affixes are heads. If we, however, conclude that these affixes are inflectional, evaluative affixes cannot be considered heads, since inflectional affixes do not generally function as heads.

With respect to the fact that Greek evaluative affixes cannot change the category of the base, Melissaropoulou and Ralli (2008) argue that this property (or the lack thereof) is not an exclusive characteristic of these affixes since other (true) derivational affixes exhibit categorial neutrality. Consider for example the Greek nominal suffixes *-dzis* and *-ia* which combine with nouns and create nouns:

- (67) a. $[_N \text{-dzis}]_N$ kafe-dzis < kafe(s)
 coffee-man.N coffee.N
- b. $[_N \text{-ia}]_N$ anthrop-ia < anthrop(os)
 humanity.N man.N

As I will show in this section, this argumentation is not accurate and Greek evaluative affixes should not be considered heads.

To begin with, the argument that derivational affixes are heads, whereas inflectional ones are not, is misleading since as I showed in Chapter 3 there are derivational affixes, namely prefixes, which do not function as heads. The *derivation vs inflection* distinction should, therefore, not be identified with the head-nonhead asymmetry.

In order to solve this issue, one could argue that the comparison should not be made between derivational affixes and evaluative suffixes, but between derivational suffixes and evaluative suffixes. This solution would not take into consideration derivational prefixes. In my opinion, such a comparison would be arbitrary and it would not be accurate either since it would raise a number of issues:

- (a) Why should evaluative suffixes be compared to derivational suffixes and not prefixes?
- (b) Why should this comparison be made between evaluative suffixes and derivational suffixes and not between evaluative suffixes and inflectional suffixes? This question is of paramount importance since there are authors (Williams, 1981b) who argue that even inflectional suffixes are heads.

- (c) Why should we *a priori* accept that derivational suffixes are heads? Which is the property that renders derivational suffixes heads and prefixes and inflectional suffixes non-heads?

It seems to me that the answer to these questions is that derivational suffixes, contrary to (most) prefixes and inflectional suffixes, have categorial properties. Consider also that the distinction between prefixes which are heads and prefixes which are non-heads is based on the categorial criterion. If anything, the answers to these questions corroborate the conclusion that the head should be identified with the *ontological class determinant* and that Greek evaluative suffixes are not heads.

Melissaropoulou and Ralli (2008) also claim that evaluative affixes are heads since they can specialize the meaning of the base they attach to and change the morphosyntactic features of the base. The critical evaluation of the various head-like notions presented in Chapter 3, however, shows that being able to specialize the meaning of the base does not render an element head because prefixes such as *re-* and *counter-*, and even non-heads in compounds can specialize or even change the meaning of the whole. The compound *agrioliá* ‘wild olive tree’, for example, does not denote any ‘kind of’ *eliá* since the non-head acts as a modifier and it specializes the meaning of the compound. Moreover, it was also argued in Chapter 3 that the morphosyntactic features of the whole are not always a matter of the head-nonhead asymmetry. Consider for example the attribution of gender and inflection class in co-ordinate compounds discussed in Section 3.3.3.

As we also argued for in Chapter 3, the only criterion which can help us decide whether an affix is a head, is the categorial criterion. It follows from this analysis that evaluative affixes should not be considered heads simply because they do not change the category of the base they combine with.

4.7.3.1 Evaluative suffixes and other affixes

In what follows, drawing on Greek data, I will try to offer a lexical-semantic account of evaluative morphology in the framework of Lieber (2004). My proposal that there are two ways to create a skeleton by subordination, predicts that evaluative affixes with no categorial properties should be accounted for by the addition of functions, i.e. subordination of functions without indexation of arguments.

A good way to start our analysis is to compare Greek diminutive suffixes to affixes such as *-ia* and *-dzis*, since Melissaropoulou and Ralli (2008) argue that all these affixes are category neutral. Let us first provide a lexical-semantic representation for each of these affixes.⁹ I use the Griko diminutive suffix *-eddha* as an indicative example.

Of the various semantic features available to us, the one which is the most relevant to evaluative morphology is the feature [scalar]. Lieber (2007) defines this feature as follows:

- (68) [\pm **scalar**]: This feature signals the relevance of a range of values to a conceptual category. With respect to [-dynamic] SITUATIONS it signals the relevance of gradability. Those SITUATIONS for which a scale is conceptually possible will have the feature [+scalar]. Those SITUATIONS for which a scale is impossible will be [-scalar]. With respect to SUBSTANCES/THINGS/ESSENCES the feature [scalar] will signal the relevance of size or evaluation (i.e. this will be the feature which characterizes augmentative/diminutive morphology in those languages which display such morphology).

Based on this feature, the skeleton of *-eddha* should be as follows:

- (69) [scalar (<base>)]
 <-size>

As far as its combinatorial restrictions are concerned, *-eddha* requires [feminine] bases. Consider the following from Melissaropoulou and Ralli (2008):

- (70) a. *ornit-eddha* < *ornit(a)*
 little hen.F *hen.F*
- b. **ner-eddha* < *ner(o)*
 little water.Neut *water.Neut*

Observe that although (70a) is grammatical, (70b) is ungrammatical for the base, *nero*, is of neuter gender.

Consider now the lexical-semantic representation of the suffixed word *orniteddha* ‘little hen’:

⁹The analysis will cover those issues which are considered important for the argumentation.

- (71) *-eddha ornita* ‘hen’
 [scalar ([+material ([]))]
 <-size>

The derivation of this word proceeds as follows: *-eddha* subordinates the skeleton of the base word, *ornita*, and contributes its semantic features to the whole. Given that *-eddha* has no argument position, this is an instance of subordination without indexing of arguments. As far as the category of the whole is concerned, this comes from *ornita* which is the head of the formation. It follows from this lexical-semantic representation that *orniteddha* denotes a kind of *ornita* with a [scalar] component of meaning.

Let us now turn to the comparison of evaluative affixes to *-ia* and *-dzis*, since these affixes and evaluative ones do not “change the category” of their bases. In my opinion, we cannot analyze these affixes on a par with evaluative affixes because, as I will show, they differ from one another with respect to (a) the internal organization of their lexical-semantic representation and (b) the semantic features which are relevant to them.

To begin with, let us comment on what we mean by “change of category”. There are a number of suffixes which are considered category-maintaining. Consider for example the word *manhood* which is created by affixation of *-hood*. This affix could be considered category-maintaining since it attaches to nouns and creates nouns. As Scalise (1988: 231) puts it “the noun ‘remains’ a noun”. Scalise (1988), nevertheless, mentions that although *manhood* ‘remains’ a noun, *-hood* changes a number of features of the base:

- (72) *man.N*, <-abstract>, <+countable>
manhood.N, <+abstract>, <-countable>

Observe that the suffix *-hood* changes the value of two features of the base, namely, <abstract> and <countable>. These features of course come from the suffix.

Melissaropoulou and Ralli (2008) argue that diminutive suffixes are heads because at least some of them can also change the semantic feature <countable> of the base. A lexical-semantic approach, however, does not favourite such a comparison between *-hood* and diminutive suffixes since the features relevant to these morphemes and the organization of their skeletons differ. Only the feature <abstract> (the equivalent of [material]) is an ontological feature. The feature <countable> (the equivalent of [B])

is a quantitative feature.

A comparison between *-ia*, *-dzis*, and evaluative suffixes will allow us to elaborate upon this issue. The suffix *-ia* as illustrated by *anthropiá* ‘humanity’ and *palikariá* ‘bravery’ creates abstract nouns:

- (73) anthrop-ia < anthrop(os) -ia
 ‘humanity’ man Dsuf
 palikar-ia < palikar(i) -ia
 ‘bravery’ brave Dsuf

In the word *anthropiá*, for example, *-ia* combines with the word *ánthropos* ‘man’ and creates an abstract noun of feminine gender. In terms of lexical semantics this means that *-ia* is a [–material] SUBSTANCE/THING/ESSENCE and, as such, it should be attributed the following lexical-semantic representation:¹⁰

- (74) *-ia*
 [–material ([], <base>)]

A comparison between the skeleton of *-ia* and the skeleton of the diminutive suffix *-eddha* in (69) reveals that there is a major difference between the two affixes; the former can be assigned a category, whereas the latter has no categorial features.

The presence of an argument in the skeleton of *-ia* has implications for the way it combines with other skeletons on a lexical-semantic level. It follows from the present analysis that *-ia* should be accounted for by subordination of functions with indexation of arguments, whereas as I already showed, co-indexation is not relevant to the affixation of a diminutive suffix such as *-eddha*. Consider the derivation of the word *anthropiá* ‘humanity’:

- (75) *-ia* *anthropos* ‘man’
 [–material ([_i], [+material ([_i]))]
 <masculine>

¹⁰My work is agnostic with respect to whether there are multiple *-ia* suffixes or not (Efthymiou, 1995, 2013). I comment on those cases in which *-ia* attaches to nouns or adjectives and denotes the property expressed by the base word, since Melissaropoulou and Ralli (2008) only focus on these cases. Of importance to my argumentation is that *-ia*, contrary to Greek diminutive affixes, bears an ontological feature, namely, [material].

In this example, the affix subordinates the skeleton of the base and the “R” arguments of both the affix and the base word are co-indexed. It is of importance to note that *-ia* does not change the value of the ontological feature [material] of the base *ánthropos*. In other words, it is not the case that the negative specification of the feature [material] of the affix can interact with the positive specification of the same feature of the base. It follows from the representation in (75) that the suffix *-ia* does not behave like the evaluative suffix *-eddha* or like prefixes which can alter the value of the quantitative features of their base, since [material] is an ontological feature and *-ia* has an argument position, i.e. “R” argument. This is a very important difference between the subordination of functions with (*-ia*) and without (*-eddha*, *-el(i)*) indexation of arguments.

The next affix to be examined is *-dzis*. This affix creates nouns which denote profession. The derived word *kafedzis* ‘coffee-man’, for example, denotes the man who prepares *kafé* ‘coffee’. In the framework of Lexical Semantics (Lieber, 2004), this means that this affix creates concrete processual SUBSTANCES/THINGS/ESSENCES. The skeleton of *-dzis* is given below:

- (76) *-dzis*
 [+material, dynamic ([], <base>)]
 <masculine>

In the lexical-semantic representation of *-dzis* we could add the feature [+animate] to the body part of the affix in order to capture the observation that it creates concrete processual animate nouns:

- (77) *-dzis*
 [+material, dynamic ([], <base>)]
 <masculine>
 <+animate>

Consider the derivation of *kafedzis* ‘coffee man’:

- (78) *-dzis* *kafes* ‘coffee’
 [+material, dynamic ([_i], [+material ([_i]))]
 <masculine>
 <+animate> <-animate>

Once more, we observe that we cannot account for *-dzis* and evaluative affixes on a par since this affix has specific categorial features and it has an argument position. As such it should be accounted for by subordination of functions with co-indexation.

The analysis presented so far suggests that evaluative affixes are not heads, since they do not change the category of the base they combine with. On the contrary, affixes such as *-ia* and *-dzis* are considered heads because they have specific categorial specification which is imposed on the derived word; *-ia* is characterized as [–material ([], <base>)] and creates abstract nouns, and *-dzis* is [+material, dynamic ([], <base>)] and, as such, it creates concrete processual nouns. In addition, Greek evaluative affixes and suffixes such as *-ia* and *-dzis* are accounted for by different mechanisms on a lexical-semantic level.

To conclude, in this section it was argued that non-argument-taking morphemes, that is, the plural suffix *-s*, prefixes such as *dis-* and *re-*, and Greek evaluative affixes should be accounted for by the same mechanism, namely subordination of functions without indexation.

4.8 On the prefix-suffix distinction

The distinction between a prefix and a suffix is based on whether an affix appears before or after a base. If an affix is attached to the front of the base morpheme, it is a prefix and if an affix appears after the base, it is a suffix. This distinction, however, cannot be made in lexical semantics since the latter is blind to the linearization of morphemes. By this we mean that the linear order by which morphemes appear inside a word is not relevant to the integration of distinct morphemes on a lexical-semantic level.

Consider for example inter- and intra-linguistic variation which is reported by Grandi and Montermini (2005). To begin with, inflectional affixes may appear on Berber verbs in the form of either prefixes (e.g. third person singular) or suffixes (e.g. third person plural). In addition, the same inflectional category may arise as a prefix in one language but as a suffix in another. The expression of number in (78) illustrates this observation; number is expressed by a suffix in Italian (79a) but by a prefix in Swahili (79b):

(79) a. Italian suffixation

alber-o ‘tree’ vs. *alber-i* ‘trees’

b. Swahili prefixation

m-tu ‘man’ vs. *wa-tu* ‘people’

With respect to derivation, the same language may exhibit both derivational prefixes and suffixes. English for example uses prefixes for negation¹¹ (e.g. *dis-*, *non-*) and suffixes for agent nouns (e.g. *player*).

Intra-linguistic variation also shows that languages such as Greek or English may use suffixation in order to create agent nouns, but languages such as Malay use prefixes in order to express this category (Grandi and Montermini, 2005: 144):

(80) a. English suffixation

sing > *sing-er*

b. Malay prefixation

nyanyj ‘sing’ > *pe-nyanyj* ‘singer’

In Lexical Semantics the distinction between classes of morphemes should not rely on their linear order inside the word but on (a) the semantic features which are relevant to a particular class of morphemes and (b) the inner structure (skeleton) of these morphemes.

First, let us comment on semantic features with particular focus on evaluative morphology. Grandi and Montermini (2005) state that typological research shows that rarely is the same category expressed by both prefixes and suffixes in the same language. Agent nouns for example are not created in language-L by both suffixes and prefixes. Evaluative affixes, and especially those affixes which relate to the expression of quantity (small-big), tend not to obey this generalization. In several languages, affixes which bear evaluative meaning may appear as both suffixes and prefixes. Italian diminution in (81) is an indicative example (from Grandi and Montermini, 2005):

(81) *appartamento* ‘flat’ > *appartamentino/miniappartamento* ‘small flat’

In this example, both the suffix *-ino* and the prefix *mini-* are used with the same meaning and function; they add an evaluative meaning.

English evaluative morphology also shows that the same category may be expressed by both prefixation and suffixation. Consider the following:

¹¹Grandi and Montermini (2005) state that in the languages of the world, there is a strong preference for negation to be expressed by prefixation.

- (82) a. *cigar-ette* ‘small cigar’
 book-let ‘small book’
- b. *mini-series* ‘small series’
 nano-circuits ‘small circuits’

The examples in (82a) are formed by the addition of a suffix, *-ette* in *cigarette* and *-let* in *booklet*, whereas the same meaning, namely ‘small’, is expressed by a prefix in (82b) as *mini-series* and *nano-circuits* illustrate.

Although on morphological grounds *mini-* and *-let* belong to different classes of affixes, that is, the former is a prefix, whereas the latter is a suffix, in Lexical Semantics this distinction does not hold. Of relevance to semantics is that both affixes bear the [scalar] feature, which characterizes diminution, in their skeleton:

- (83) Skeleton for *mini-* and *-let*
 [scalar (<base>)]
 <-size>

In addition to the semantic features which are relevant to a morpheme, the distinction between the various classes of morphemes should be based on the structure of their skeleton as well. As argued for in this chapter, the structure of the skeleton is important for the way a morpheme combines with other morphemes on semantic grounds. The skeleton provided for *mini-* and *-let* in (83) informs us that these affixes create skeletons by subordination of functions without indexation. Hence, they can subordinate the skeleton of the base and add a [scalar] component of meaning to the base word.

As I proposed in the present chapter, the same mechanism should handle affixes such as the plural suffix *-s*, prefixes such as *re-*, and evaluative affixes (e.g. Greek *-el(i)* and English *-let*) which can add their semantic features to the skeleton of the whole by subordination of functions without indexation. These affixes are deprived of arguments and, as a result, they can either add their features to the whole or alter the value of the features which form part of the skeleton of the base.

4.8.1 A comparison between *re-* and *-s*

In what follows, I provide a comparison between the prefix *re-* and the plural suffix *-s*¹² which will allow us to raise two main questions pertaining to the classification of morphemes in Lexical Semantics and the inherent inflectional category of *number*.

To begin with, as I argued above, morphemes on lexical-semantic grounds should be distinguished based on (a) the kind of semantic features they contribute to a word and (b) the structure of their lexical-semantic representation (and most importantly the structure of their skeleton).

Based on a purely morphological analysis, these affixes have nothing in common since *re-* is a derivational prefix, whereas *-s* an inflectional suffix. A lexical-semantic approach, however, allows one to propose that these affixes could very well have some shared properties. First, let us comment on the structure of their skeleton. Based on the analysis argued for by Lieber (2004) for *-s* and the proposal defended in the present thesis for *re-*, both affixes should have the structure in (84):

(84) [F₁ (<base>)]

On the assumption that both affixes have no argument position, *re-* and *-s* should be accounted for by the same mechanism, namely subordination of functions without indexation of arguments. As a result, both affixes are allowed to (a) change the value of the features of inner morphemes or (b) add their features to the base skeleton.

Second, a closer inspection of the semantic features relevant to these affixes reveals that both *re-* and *-s* could be characterized as “quantificational” affixes. As presented in Section 4.7, Lieber (2004) argues that *re-* bears the quantificational feature [+CI] in its skeleton and *-s* is characterized by the quantificational features [–B, +CI]. In (85) I repeat the definitions of the features [B] and [CI]:

(85) [± B]: This feature stands for ‘Bounded’. It signals the relevance of intrinsic spatial or temporal boundaries in a SITUATION or SUBSTANCE/THING/ESSENCE. If the feature [B] is absent, the item may be ontologically bounded or not, but its boundaries are conceptually and/or linguistically irrelevant. If the item bears the

¹²The choice of *re-* and *-s* was based on that these morphemes have been commented on by Lieber (2004, 2007).

feature [+B], it is limited spatially or temporally. If it is [-B], it is without intrinsic limits in time or space.

[± CI]: This feature stands for ‘Composed of Individuals’. The feature [CI] signals the relevance of spatial or temporal units implied in the meaning of a lexical item. If an item is [+CI], it is conceived of as being composed of separable similar internal units. If an item is [-CI], then it denotes something which is spatially or temporally homogeneous or internally undifferentiated.

The major point to note here is that Lieber argues that these features are relevant to the discussion of the quantificational properties of both nouns and verbs. This follows from the cross-categorial characteristic of the lexical-semantic framework developed by Lieber (2004) since semantic features should be used for the discussion of various categories. In addition, these features are meant to handle only those quantitative characteristics of meaning which manifest themselves in the simplex lexicon and not those quantitative aspects which appear at higher levels of syntactic/semantic organization.

In more detail, as far as SUBSTANCES/THINGS/ESSENCES are concerned, the feature [B] can be used to distinguish between count [+B] and mass [-B] nouns. In addition, the feature [CI] is used for the distinction between nouns which are not composed of discernible replicable parts, i.e. [-CI], and aggregates which are characterized as [+CI]. Consider the following from Lieber (2004: 137):

(86)	[+B, -CI]:	singular count nouns	<i>person, pig, fact</i>
	[-B, -CI]:	mass nouns	<i>furniture, water</i>
	[+B, +CI]:	group nouns	<i>committee, herd</i>
	[-B, +CI]:	plural nouns	<i>cattle, sheep</i>

The noun *person*, for example, is characterized as [+B, -CI] because it is an individual noun (count noun) and at the same time, is not composed of discernible replicable parts. The word *furniture* bears the specification [-B, -CI] in its skeleton since it is a mass noun and *herd* as a group noun is characterized by the features [+B, +CI]. Finally, the plural noun *sheep* is a conglomeration of similar individuals and is, therefore, characterized by the features [-B, +CI] in its skeleton.

With respect to verbs, [B] and [CI] capture quantitative and aspectual characteristics. [+B] events are those events which may have duration, but their duration is not

linguistically significant, whereas [-B] events are those verbs the duration of which is linguistically significant. A temporally punctual situation, i.e. a [+B] event, such as *exploded* and a temporally durative one, i.e. a [-B] event, such as *walk*, behave differently with adverbials. Compare the following sentences:

- (87) a. *The bomb exploded for an hour.
 b. We walked for an hour.

The examples in (87) show that language makes a distinction between those events which are punctual and those events which are durative; the durative adverbial *for an hour* can only be used with the [-B] *walk* and not the [+B] *explode*.

The use of the feature [CI] with respect to events captures the distinction between iterativity and homogeneity. In more detail, Lieber argues that the use of [CI] with a positive value is the equivalent of plurality in nouns. Just as plural nouns are composed of discernible replicable parts, [+CI] events such as *pummel* denote repeated actions of the same sort; *pummel* ‘to produce repeated blows’. The use of [CI] with a negative value with respect to events corresponds to non-plural nouns (single individuals or mass nouns). Therefore, [-CI] SITUATIONS are those events which are not composed of multiple, repeated actions of the same sort. The following summarizes the various aspectual event classes:

- | | | | |
|------|------------|-------------------------|-------------------------------|
| (88) | [+B, -CI]: | nonrepetitive punctuals | <i>explode, jump, flash</i> |
| | [-B, -CI]: | nonrepetitive duratives | <i>descend, walk, draw</i> |
| | [+B, +CI]: | <logically impossible> | |
| | [-B, +CI]: | repetitive duratives | <i>totter, pummel, wiggle</i> |

A [+B, +CI] SITUATION is not possible since this would mean that an event could be both punctual and composed of multiple, repeated, and identical actions.

4.8.1.1 On the inherent category Number

The foregoing discussion suggests to me that the way Lieber (2004) analyzes the quantificational characteristics of nouns and verbs allows one to propose that the iterative prefix *re-* and the plural suffix *-s* are both related with the inherent inflectional category *number*.

The use of number with respect to nouns is very well studied within and across languages. With respect to nouns, research has shown that this category manifests itself in the singular-plural distinction and, in addition, some languages may exhibit other distinctions since they may use dual or trial in order to refer to two or three entities respectively. This gives us the following system of nominal number values:

(89) singular dual trial plural

This is of course only one of the possible number systems, since there are languages with more complex systems. As reported by Corbett (2000), languages such as Bayso and Avar have the number *paucal* which is similar to the English ‘a few’.

It should be stressed that there are languages which may also have the category *verbal number*. This category with respect to SITUATIONS can express a number of meanings including the following: repetition, iteration, distribution (e.g. the event or action happens at different places, plurality of sites of action), intensity, or even frequency of an action.¹³ As we will see in later discussion, given the range of meanings expressed by verbal number, it is sometimes very difficult to distinguish it from aspect.

It should also be noted that verbal number is an inherent category and not just a number which is expressed by inflectional markers on the verb. On this issue consider the following. Although it is very difficult to distinguish verbal number from nominal number, the former should not be confused with the subject-verb agreement evident in many languages. Consider the following from Greek:

(90) *Dio fil-i sizit-un.*

Two friend-PL discuss-PL

In this example, the plural marker *-un* on the verb shows agreement between the verb and its subject which also appears in the plural. Thus, this example exhibits an instance of nominal number and not an instance of verbal number.

According to Corbett (2000), verbal number can be distinguished into (a) *event number* and (b) *participant number*. Of importance to our argumentation is the former, that is, *event number* which shows the number of times an action is done; it refers to the

¹³The term *pluractional* is mainly used by Africanists in order to describe plural verbs since this category of verbs is frequently attested in African languages (Newman, 1990).

quantificational aspects of the action denoted by the verb. *Participant number* marks the number of entities in an action and it is not relevant to our study.

In order to better understand what event number is, consider the following from Hausa (Eulenberg, as cited in Corbett, 2000: 246):

- (91) a. *naa aikee su*
 I send them
- b. *naa a''aikee su*
 I send.PL them

Observe that in both sentences there is a plural object and a singular subject. As Corbett mentions, the difference between the two sentences is that the verb form *a''aikee* with partial reduplication expresses plurality. This means that in (91b), contrary to (91a), there were more than one ‘sending-event’.

As far as the morphological status of the category number is concerned, research has shown that number should be considered as *inherent inflection*. According to Booij (1996), the distinction between *inherent* and *contextual* inflection is the following: although the former is not required by the syntactic context, the latter is dictated by syntax. Number in this respect is inherent inflection since it is semantically meaningful and it is not dictated by syntax, although it may be relevant to syntactic processes such as agreement.

The analysis defended by Lieber (2004) shows that the quantificational properties of simplex lexical items are inherent to these items, semantically meaningful, and not dictated by syntax. Consider for example the skeletons in (92); (92a) illustrates the skeleton of a count noun and (92b) gives an example of the skeletal part of a non-repetitive durative event:

- (92) a. *book* [+material, +B, -CI ([])]
- b. *forest* [+dynamic, -B, -CI ([], [])]

The skeletons in (92) illustrate lexical items in their singular form since both words are characterized as [-CI]. Let us now comment on the results of “pluralization” by *-s* for *book* and *re-* for *forest*:

- (93) a. *books* [-B, +CI ([+material, +B, -CI ([]))]
 -s *book*
- b. *reforest* [+CI ([+dynamic, -B, -CI ([], []))]
 re- *forest*

In (93a), the plural suffix *-s* subordinates the skeleton of *book* and it changes the value of the inner features [B, CI] of the base. On the assumption that the iterative meaning imposed on *forest* by the prefix *re-* is the situational correlate of plural in nouns (on this see previous discussion and Lieber, 2004: 138), one could propose that the two affixes are quite similar under a lexical-semantic analysis.

The similarity between *re-* and *-s* is not to be attributed only to the formal organization of their skeletons (both are deprived of arguments) but also to that they express similar quantificational categories; *-s* shows plural number in SUBSTANCES/THINGS/ESSENCES and *re-* expresses iteration which could be considered as a kind of verbal plurality. In particular, on the assumption that *re-* only bears the quantificational feature [+CI], this prefix begins to look more like inflectional rather than derivational affixes. A comparison between *re-* and other “true” derivational suffixes such as *-er*, shows that *re-* is deprived of those features which usually form part of the skeleton of a derivational suffix. By way of example, *re-* bears no categorial features.

Of major importance to our discussion is that *re-* as a derivational prefix is not expected to bear inflectional characteristics and this, of course, raises the issue of demarcation between inflection and derivation. To be more specific, the basic criterion for the distinction between derivation and inflection is that derivation creates new lexemes, whereas inflection creates forms of the same lexeme. That is, the derivational suffix *-er* attaches to the base *play* and it derives a new lexeme, namely *player*, whereas the inflectional suffix *-s* combines with *player* to create the plural form of this lexeme. In this respect it is not clear whether prefixation of *re-* creates a new lexeme or just a form of the same lexeme. By way of example, attaching *re-* to a verb, e.g. *re-forest* and *re-write*, does not have the same results as attaching *-er* to *play*. In other words, it is not clear whether *re-write* is a new lexeme as *player* clearly is. In more detail, suffixation of *-er* to *play* creates a deverbal lexeme. Prefixation of *re-* to *write*, however, affects only the part of the base-skeleton which comprises those features which are related with

inherent inflection; number is a category which is considered inherent inflection. That is, *re-* behaves like the plural *-s* since suffixation of *-s* affects only the quantificational characteristics of the base-skeleton.

Consider also the recursive structure of a word such as *re-re-re-re-re-write*. The meaning of this word is very closely related to event number since this prefixed verb denotes multiple occurrences of the action ‘write’; multiple ‘writing events’. This is not to say that *re-* prefixation should be equated with pluractional verbs in languages such as Hausa, but that the iterative component of meaning added to the skeleton of a base word could be seen as a kind of event number since it clearly denotes a situational plural meaning. On this issue consider the following from Squamish (Bar-el, 2008: 3):

- (94) a. *chen kwelesh-t ta sxwi7shn*
 1S.SG shoot-TR DET deer
 ‘I shot a deer’
- b. *chen kwel-kwelesh-t ta sxwi7shn*
 1S.SG REDUP-shoot-TR DET deer
 ‘I shot it several times’ / ‘I shot the deer continuously’

Observe that, in these examples, the plurality expressed by reduplication is different from the one expressed by *re-* in *re-write*. Although both the reduplication in (94b) and the prefix *re-* denote plurality, *re-* in *re-write* denotes only one ‘write-event’ more, whereas the reduplicated verb *kwel-kwelesh-t* does not specify the number of ‘shooting-events’ (it is in a way unbounded [-B]).

It should be stressed that event number cannot be easily distinguished from verbal aspect and, as a result, the former could be considered a sub-type of aspect. Consider for example the aspectual meaning ‘continuously’ which is expressed by the reduplicated verb *kwel-kwelesh-t* in (94b). Although Corbett (2000) is aware of this issue, he argues that event number could be analyzed as a category on its own right since: (a) plurality seems to be relevant to the discussion of both verbs and nominals, (b) participant number may be difficult to explain in terms of verbal aspect, and (c) “plural verb” is a term which is frequently used with respect to the analysis of certain language families and, as a result, we should consider event number and verbal aspect distinct.

In my opinion, Lieber’s analysis of the lexical-semantic representation of *re-* argues in favour of the proposal that we should not collapse event number and aspect since

her work reveals that quantificational characteristics are relevant to both nominals and events. More specifically, as presented in Section 4.7.2.2, the prefix *re-* only bears the feature [+CI] in its skeleton and according to Lieber, the use of [CI] with a positive value, i.e. [+CI], is the equivalent of plurality in nouns. To put it bluntly, just as plural nouns are composed of discernible replicable parts, [+CI] events denote repeated actions of the same sort. On the assumption that *re-* only bears the feature [+CI], we can argue that there is a relation between nominal number, i.e. number of entities, and event number, i.e. number of events. As a result, event number should not be considered a sub-type of event aspect.

The conclusion that plurality in SITUATIONS should not be identified with aspect may be corroborated by the analysis of the progressive. Consider the (partial) lexical-semantic representation of the progressive from Lieber (2004: 152):

- (95) *-ing*
 [-B (<base>)]

The skeleton in (95) informs us that *-ing* has no argument position and as a result adds the feature [-B] to the skeleton of the base by subordination of functions without indexation. The addition of the feature [-B] to a base turns the verb into a durative SITUATION. Of importance to the plurality-aspect distinction, is that Lieber uses the (aspectual) feature [B] only with respect to *-ing* and not *re-*. The analysis defended by Lieber shows that ‘continuousness’ and ‘duration’ [-B] which are meanings related with the category verbal aspect, should be considered distinct from plurality [+CI] which is manifested in *re-*prefixation.

To sum up, in this section I argued that morphemes could be classified in Lexical Semantics according to: (a) the internal organization of the lexical-semantic representation of a morpheme and (b) the semantic features relevant to a morpheme. Based on these criteria, I addressed the suffix-prefix distinction and I compared the derivational prefix *re-* to the inflectional suffix *-s*. Assuming the feasibility of my analysis, the prefixation of *re-* to verbs and the suffixation of *-s* to nouns could be seen as similar processes under a lexical-semantic account since both affixes contribute their semantic features in the same way and both bear semantic features related to plurality in their skeletal part. This has implications for the distinction between derivation and inflection since *re-* as a derivational affix, is not expected to exhibit inflectional properties. Finally, I argued

that we should not collapse verbal plurality and verbal aspect since (a) plurality manifests itself in both nominals and events and (b) ‘continuousness’ and ‘duration’ which are meanings related to aspect, should be considered distinct from plurality which is expressed by *re-*. I will, however, leave this issue for future research since a detailed analysis of the progressive in lexical semantics is lacking.

4.9 Conclusions

The purpose of this chapter was to elaborate upon the way the head-nonhead asymmetry should be accounted for in the framework of Lexical Semantics (Lieber, 2004). It was argued that the head for the purposes of lexical semantics should be a matter of the grammatical skeleton and not the pragmatic body and, as a result, the identification of head based on the hyponymy test which applies to the encyclopedic part of the body should be reconsidered. My analysis showed that the head in lexical semantics should be identified with the *ontological class determinant*.

Based on this definition of head, it was argued that there are two ways to create an affixed word: (a) subordination of functions with indexation of arguments and (b) subordination of functions without indexation of arguments; the former accounts for the affixation of argument- and category-bearing affixes (e.g. *-er*), whereas the latter handles affixation in the absence of indexation.

In Section 4.7, I argued that subordination without indexation is able to account for (non-argument-taking) inflection, prefixation, and evaluative morphology. In order to defend this proposal, I suggested that the skeleton of prefixes should be reformulated and that prefixes should not come with an argument position. In addition, I proposed that Greek evaluative affixes should not be considered heads of their formations since they cannot alter the category of the base word.

An affix which comes with no argument position in its skeleton can affect the skeleton of the base in two ways: (a) it can add its skeletal features to the skeleton of the base word and/or (b) change the value of a semantic feature of the base. The prefix *dis-* for example can add a negative component of meaning to the base skeleton and the prefix *re-* can change the [-CI] specification of the base into [+CI].

To conclude, in Section 4.8, I argued that morphemes should be classified according

to two main criteria: (a) the semantic features which are relevant to each morpheme and (b) the internal organization of the lexical-semantic representation of a morpheme. In this respect, the distinction between prefixes and suffixes which is based on the linear order of morphemes cannot be used as a criterion in lexical semantics. Finally, the comparison between the prefix *re-* and the plural suffix *-s* showed that these two affixes have shared properties (similar skeletal organization and quantificational features) which can only be revealed and accounted for under a lexical-semantic approach.

Part III

On the position of head

Position of head: System-external factors

Although head was introduced into morphology in the early 80's, there is very little in the literature to date that deals with the issue of the head-nonhead order inside words. Part III of this thesis is devoted to the study of possible system-internal and system-external factors which could affect the head-dependent linearization in morphological configurations and, more specifically, in compounds. In this chapter, I consider system-external motivation and in the next chapter, I elaborate upon system-internal factors.

More specifically, the purpose of the present chapter is to analyze the phenomenon of left-headedness in Greek and its dialects and especially in the Bovesese dialect spoken in Southern Italy. This phenomenon is of particular interest since Bovesese, being a dialect of Greek origin, is not expected to exhibit such a head-initial compounding pattern.

This study will allow us to comment on which items are less or more susceptible to borrowing. In the case of morphological change, despite the fact that the borrowing of affixes and words is well documented, there are widely divergent views on whether there is contact-induced structural change such as rule-transfer. Even in the cases where a rule seems to have been transferred from one language to another, the traditional view

is that the rule in question has not been transferred as such, but rather it is the result of abstraction from previously borrowed lexical items.

The rest of this chapter is structured as follows: in Section 5.1, I present the field of contact linguistics and comment on the transferability of morphosyntactic rules (Section 5.1.2) and the factors which promote or inhibit contact-change (Section 5.1.3). In Section 5.2, I discuss the position of head with respect to Greek and Italian compounding and present the phenomenon of left-headedness in Italiot-Greek. In addition, I formulate the hypothesis that this phenomenon should be attributed to Italian influence (Section 5.2.4). In Section 5.3, I test the hypothesis that this change could be the result of Romance influence on Italiot-Greek. In more detail, I comment on when and whether a structural change could be considered a contact-induced phenomenon (Section 5.3.1) and present evidence which militates against the language-interference hypothesis (Section 5.3.2). Section 5.4, summarizes and concludes this chapter.

5.1 Contact-induced language change

The co-existence of two or more languages and the interaction between them can lead to change and the term *language contact* is used to cover all phenomena which are the result of cross-linguistic influence. As defined by Thomason (2001: 1), “In the simplest definition, language contact is the use of more than one language in the same place at the same time”. In cases of contact-induced change we can identify, on the one hand, a *source language*, that is, the language which acts as the donor and, on the other hand, a *recipient language*, which is the language which has undergone the change in question. As far as the relation between language interference and language change is concerned, Thomason (2001: 62) and Thomason (2010: 32) argues that “any linguistic change that would have been less likely to occur outside a particular contact situation is due at least in part to language contact”.

Contact between languages can lead to borrowing. Languages usually resort to the introduction of elements from other languages in order to resolve ambiguity and to fill gaps in their morphological paradigms (Hickey, 2010: 14). Research has shown that language contact may result in the introduction of words and affixes from a donor into a recipient language, but it can also lead to

- (a) contact-induced language change,
- (b) extreme language mixture which results in pidgins, creoles and bilingual mixed languages, and
- (c) language death.

Contact-induced language change may result in the loss, addition, and replacement of features (Thomason, 2001: 60). In the first case, the loss of features is usually associated with the loss of system-internal complexity. In a number of languages, for example, research has shown that language interference has led to the loss of inflectional paradigms. Addition of features involves the transfer of elements, such as words and morphemes from the source to the recipient language. Finally, elements of the recipient language could be replaced by elements of the source language.

The transfer of overt phonemes, morphemes, and words is called *direct transfer*, whereas the term *indirect transfer* or *indirect diffusion* refers to the transfer of structural patterns. In this study we will focus on the latter, that is, the transfer of a structural pattern.

5.1.1 Contact and compounding

The variation with respect to the position of head in compounds is usually considered a result of contact between a donor and a recipient language. Vietnamese, for example, has a native left-headed compounding pattern and a right-headed one which is considered the result of contact with Chinese. As Alves (2001: 229-230) reports, Vietnamese compounds may consist of two Vietnamese words, one Vietnamese and one Chinese word, or even two Chinese words. In the case of Vietnamese, the presence of a non-native compounding pattern can be attributed to the heavy borrowing of compound words from Chinese.

Ogloblin (as cited in Bauer, 2009) also reports that in Javanese compounding there are two different compounding patterns; a native head-initial pattern and a head-final one which is borrowed from Sanskrit. Bauer (2009), however, concludes that how often such factors affect the order of compound members is unclear. The present thesis aims to shed some light on the question implied by Bauer.

5.1.2 On the transferability of morphosyntactic rules

A pervasive issue in the study of language contact and language change is whether morphosyntactic rules can be transferred directly from a source to a recipient language. On the one hand, the addition of new features and the replacement of old ones are well documented. For example, there are numerous works on the borrowing of lexical items such as loanwords and derivational affixes (see for example Ralli, 2012a). In several cases, these loans are not introduced into the system of the recipient language as such, but they may undergo some integration processes. For instance, it has been demonstrated by Ralli (2012b) that Romance verbal loans are integrated in Griko with the Greek verbalizer *-ev(o)*, while Heptanesian, the dialect of the Ionian islands, adapts its loans with *-ar(o)*, which originates from the Italian infinitival marker *-are*:

(1)	Griko	Italian	Salentino	Meaning
	<i>bbundeo</i>	<i>abbondare</i>	<i>bbunn(d)áre</i>	abound
	<i>bbampeo</i>	<i>avvampare</i>	<i>bbampáre</i>	go red
	<i>cekeo</i>	<i>aceccare</i>	<i>éikáre</i>	blind
	<i>ffrunteo</i>	<i>affrontare</i>	<i>ffruntáre</i>	confront
	<i>jestimeo</i>	<i>bestemmiare</i>	<i>jaštímáre</i>	blaspheme
(2)	Heptanesian	Italian	Venetian	Meaning
	<i>avizaro</i>	<i>avvisare</i>	<i>avisar</i>	advise
	<i>ankoraro</i>	<i>ancorare</i>	<i>ancorar</i>	anchor
	<i>brostolare</i>	<i>abbrustolire</i>	<i>brusto(l)ar</i>	roast
	<i>fioriro</i>	<i>fiorire</i>	<i>fiorir</i>	blossom
	<i>jestimeo</i>	<i>bestemmiare</i>	<i>jaštímáre</i>	blaspheme

On the other hand, the (direct) transfer of rules has met with vast scepticism (Sapir, 1921; Oksaar, 1972; Winford, 2003). The traditional view which has been called *the no-rule-transfer view* is that a direct transfer of grammatical rules cannot occur. Even in the cases where a rule seems to have been transferred from one language to another, the rule is not transferred as such, but rather it is the result of abstraction from previously borrowed lexical items. In other words, what seems to be a case of rule-transfer, is actually a generalization over loanwords. To adduce an example, one might take into

inspection the vowel harmony patterns in Asia Minor Greek (Dawkins, 1916: 68) which are the result of generalization over the large number of Turkish borrowings displaying vowel harmony.

5.1.3 Factors promoting or inhibiting contact-change

In what follows, let us elaborate upon the issue of rule-transfer and the factors promoting or inhibiting external change. One of the most controversial issues in the study of language change is whether there are linguistic features and grammatical components which are more or less likely to change under the influence of external sources.

On the one hand, Meillet (1921), Sapir (1921), and Jakobson (1938) are prominent proponents of the idea that certain grammatical components are impenetrable and that external change is heavily constrained by the architecture of these components. On the other hand, there are scholars who argue that no absolute constraints can be formulated with respect to contact-induced change. For example, Thomason (2010: 41) holds the view that intense contact may lead to the transfer of any linguistic feature; a proposal very similar to what Matras (1998: 282) calls the “anything-goes hypothesis”.

The cross-linguistic research which followed the work of Weinreich (1953) has identified a number of system-internal and system-external factors which can affect the possible ways languages could influence one another.

To begin with, system-external (social) factors which could affect the influence exerted on a recipient language are usually the following: imperfect learning, speakers’ attitude, the number of speakers of the languages in question, the social status of both the source and the recipient language, the level of bilingualism, and intensity of contact. Of these, the last two are considered to be the most important since a longer contact period combined with a high level of bilingualism usually results in the transfer of more features. In fact, it could lead to *language shift*.

According to Thomason and Kaufman (1988) and Thomason (2001: 70-71) casual contact leads to the borrowing of non-basic vocabulary and in slightly more intense contact we usually witness the borrowing of conjunctions and of some minor structural elements as well. Additionally, more intense contact has as a result the borrowing of non-basic vocabulary and structural features such as derivational affixes. Finally, intense contact which results in a high level of bilingualism may lead to heavy borrowing

in all grammatical systems.

Much literature has also concentrated on possible system-internal factors which could facilitate or prohibit change in contact situations. The first factor relates to the typological distance between the involved languages. Based on this factor, the typologically closer two systems are, the more possible it is to have contact-induced change, whereas, typological dissimilarity tends to prohibit the transfer of features. In addition, this hypothesis encompasses the idea that the availability of formal correspondence between the involved subsystems could facilitate the transfer of features.

Another hypothesis usually made is that some grammatical subsystems are more or less amenable to change as a result of language contact. According to this hypothesis, contact-induced change is harder to arise in the structural elements which form the core of grammatical subsystems (e.g. word order, head-dependent order) whereas peripheral structural elements such as sentence connectors are usually more susceptible to change (Hickey, 2010).

Another factor relates to what Thomason (2010: 44) calls “degree of integration into the system”. This means that systems with high internal organization are less amenable to change as a result of contact. On the contrary, systems with low degree of structural cohesiveness usually tend to be influenced by external sources. This could explain the fact that the lexicon is the first subsystem which is affected in cases of language contact, whereas the paradigmatic nature of the organization of inflectional systems tends to make inflectional affixes less amenable to change under the influence of external sources. This factor is similar to what Van Coetsem (1988: 25) calls the “stability gradient of language” according to which, some subsystems, as for example inflectional paradigms, are more stable compared to others, such as the lexicon and this yields as a consequence that words are more susceptible to transfer than inflectional affixes.

It has also been assumed that the more transparent an element is, the more likely it is to be transferred. The idea of transparency includes transparency in form, meaning, and function. This means that an element in a source language with an opaque meaning and function, which is difficult to isolate, is a bad candidate for transfer.

What is more, languages very often resort to borrowing in order to fill gaps in their system. The simplest kind of this gap-filling manifests itself in the borrowing of words or derivational affixes which are not available in the native inventory of the recipient

language. A corollary of this is that the more gaps present in the recipient language, the more borrowing is facilitated.

Scholars tend to propose borrowability/transferability scales which capture the above mentioned factors which have been hypothesized to govern external change. Field (2002), for example, who identifies a link between grammaticalization and borrowability, proposes the following Hierarchy of Borrowability, according to which structural (grammaticalized) elements are harder to be borrowed:

(3) content item > function word > agglutinating affix > fusional affix

Field (2002: 38)

Other scholars propose scales based on the frequency of borrowed items in certain case studies:

(4) nouns > adjectives > verbs > prepositions > coordinating conjunctions > quantifiers > determiners > free pronouns > clitic pronouns > subordinating conjunctions

Muysken (1981)

(5) nouns > verbs > adjectives > adverbs, prepositions, interjections

(Haugen, 1950: 224)

(6) nouns > adjectives > verbs > prepositions

Singh (1982)

Field (2002) argues that the above mentioned hierarchies/scales have the following implications for external change. Firstly, moving from left to right, we expect to find more borrowed elements. For example, we expect to find more borrowed nouns than verbs, more verbs than prepositions etc. Secondly, a recipient language which has incorporated adverbs of foreign origin, for example, is expected to have borrowed verbs, adjectives and nouns, as well.

Finally, the proposed clines allow one to draw the conclusion that open-class items, such as nouns, participate in borrowing more readily than closed-class elements, as for example determiners.

5.2 The problem: Data

In this section, I present the phenomenon of left-headedness in Italiot and raise the question whether the presence of such compounds in this dialect could be attributed to Italian influence. In what follows, I first comment on the position of head in Standard Modern Greek, Cypriot (5.2.1), Italiot (Section 5.2.2), and Italian (Section 5.2.3) compounds, and I then formulate the hypothesis that left-headedness is a contact-induced phenomenon (Section 5.2.4).

5.2.1 The position of head in Greek

With respect to the position of head, Greek compounds are right-headed. Consider the following indicative examples from Standard Modern Greek (Ralli, 2005, 2013) and Cypriot (Andreou, 2010):

(7) a. [A N]_N

agri-o-gat-a < *agri(a) gat(a)* SMG
 wild-LE-cat-Infl wild cat
 ‘wild-cat’

glik-o-kolokas-on < *glik(o) kolokas(in)* Cypriot
 sweet-LE-potato-Infl sweet kind of potato
 ‘sweet-potato’

b. [N N]_N

psar-o-vark-a < *psar(i) vark(a)* SMG
 fish-LE-boat-Infl fish boat
 ‘fishing boat’

ampel-o-pervol-on < *ampel(in) pervol(in)* Cypriot
 vine-LE-field-Infl vine field
 ‘vine field’

c. [N V]_V

xart-o-pez-o < *xart(i) pez(o)* SMG
 card-LE-play-Infl card play
 ‘to play cards’

<i>axer-o-kuval-o</i>	< <i>axer(on) kuval(o)</i>	Cypriot
straw-LE-carry-Infl	straw carry	
‘to carry straw’		
d. [Adv. V] _V		
<i>sig-o-vraz-o</i>	< <i>sig(a) vraz(o)</i>	SMG
slowly-LE-boil-Infl	slowly boil	
‘to stew’		
<i>kal-o-mairefk-o</i>	< <i>kal(a) mairefk(o)</i>	Cypriot
well-LE-cook-Infl	well cook	
‘to cook well’		

Observe that all compounds in (7) are right-headed and that this holds irrespective of the lexical category of the whole formation or the compound members. For instance, the [Adv. V]_V *sigovrázo* is headed by the verb *vraz(o)* ‘to boil’ and not the Adv. *sig(a)* since the whole compound is a verb and not an adverb. In a similar vein, the head of the [A N]_N *agriógata* is on the right.

5.2.2 The position of head in Italiot

Italiot is a Greek-based dialect spoken in Southern Italy restricted in two areas, Puglia (Salento area) and Calabria (Bovese area). The dialect spoken in Puglia is called Griko and the one spoken in Calabria, Bovese.

Bovese-Greek, which will concern us in the present chapter was until recently spoken in nine villages all located in the Bovese area of Calabria. At the present time, however, due to various reasons, such as poor economy and natural disasters, a number of villages have been deserted and Bovese is in rapid decrease; it is typically spoken by elderly people and Katsoyannou (1999: 607) reports that in the late 90’s there was an estimated number of no more than 500 native speakers.

The debate with respect to the origins of Italiot has yet to be settled (see among others, Morosi, 1870; Rohlf, 1924; Fanciullo, 2001) since on the one hand, Italian researchers treat it as a dialect “planted on Italian soil during the Byzantine period” (Manolessou, 2005: 112), whereas, Greek scholars consider it a continuation of Ancient Greek (Magna Grecia). Most scholars, though, accept the view that Italiot has been spoken in Italy since ancient times but that until the late Middle Ages, it followed

the same evolutionary path as the other Greek dialects.

Given that Bovese is of Greek origin, it is expected to exhibit right-headed compounds. Several scholars (Rohlf, 1950; Alessio, 1953; Karanastasis, 1992, 1997), however, report that in this dialectal variety one finds left-headed $[N N]_N$ compounds. Consider the following examples:

- (8) *fid̥d-ambel-o* < *fid̥d(o) ambel(i)*
 leaf-LE-vine-Infl leaf vine
 ‘vine leaf’
- klon-o-spart-o* < *klon(o) spart(o)*
 twig-LE-sedge-Infl twig sedge
 ‘twig of sedge’
- ššul-o-potam-o* < *ššul(o) potam(o)*
 wood-LE-river-Infl wood river
 ‘lit. wood of the river, driftwood’
- ššul-o-furr-o* < *ššul(o) furn(o)*
 wood-LE-oven-Infl wood oven
 ‘timber for the oven’
- spor-o-marath-o* < *spor(o) marath(o)*
 seed-LE-fennel-Infl seed fennel
 ‘fennel seed’
- xer-o-sikl-i* < *xer(i) sikl(a)*
 handle-LE-bucket-Infl hand, handle tin bucket
 ‘handle of tin bucket’
- xer-o-murtar-o* < *xer(i) murtar(i)*
 handle-LE-mortar-Infl hand, handle mortar
 ‘lit. hand of the mortar, pestle’
- xort-anem-i* < *xort(o) anem(o)*
 grass-wind-Infl grass wind
 ‘lit. grass of the wind, kind of grass’

kork-o-ššin-o < *kokk(o) ššin(o)*
 seed-LE-pistacia-Infl fruit/seed pistacia
 ‘fruit/seed of pistacia’

sakk-o-krevat-i < *sakk(o) krevat(i)*
 bag-LE-bed-Infl bag bed
 ‘lit. bag of the bed, mattress’

ridz-aft-i < *ridz(a) aft(i)*
 root-ear-Infl root ear
 ‘base of the ear’

skat-o-pontik-o < *skat(o) pontik(o)*
 dropping-LE-mouse-Infl droppings mouse
 ‘lit. droppings of mouse, worthless person’

agratht-o-sider-o < *adraxt(i) sider(o)*
 spindle-LE-iron-Infl spindle iron
 ‘iron spindle’

mastr-o-mil-o < *matr(a) mil(o)*
 trough-LE-mill-Infl the trough mill
 ‘the trough into which the flour from the mill is collected’

riz-o-plak-o < *riz(a) plak(a)*
 root-LE-stone_plate-Infl root stone_plate
 ‘the root of the stone plate’

In order to identify the head in these formations let us apply the categorial and hyponymy tests. As argued for in Chapter 3, given that both members of these compounds belong to the lexical category of noun, we have to rely on the semantic test of hyponymy¹ which qualifies the left-most element as the head of each compound in (8). For example, the head in *sporomárat̃ho* is *spor(o)* ‘seed’ since the whole compound denotes a kind of *spor(o)* ‘seed’ and not a kind of *marath(o)* ‘fennel’. In a similar vein, *fiđđámbelo* is a kind of *fiđđ(o)* ‘leaf’ and not a kind of *ambel(i)* ‘vine’.

¹As argued for in Chapter 3, the hyponymy test may apply to some compounds as a complementary test to help us identify the categorial determinant. Failure of the hyponymy test to identify the hyperonym does not render a compound headless.

The structure of these [N N] compounds is particularly striking, since Bovesè, being a dialect of Greek origin, is not expected to exhibit left-headed compounds. In fact, the corresponding compounds in Standard Modern Greek are all right-headed, as expected by headedness considerations in Greek. Compare the examples in (8) to their corresponding SMG right-headed *ampel-o-fill-o* ‘vine-LE-leaf-Infl’, *spart-o-klon-o* ‘sedge-LE-twigg-Infl’, *potam-o-ksil-o* ‘river-LE-wood-Infl’, and *marath-o-spor-os* ‘fennel-LE-seed-Infl’. It is important to note, though, that the productivity of this phenomenon in Bovesè-Greek has led to the development of compounds such as *xerosíkli*, *sakkokreváti*, *rizzáfti*, and *rizóplako*² which are not attested in SMG in any form. For example, there are no compounds such as *siklóxero*, *krevatósakos*, *aftórizo* or *plakórizo* in SMG.

5.2.3 The position of head in Italian compounds

The question which arises is whether the left-headed pattern in the dialects of Southern Italy could be the result of language interference. First, let us comment on the position of head in Italian compounds.

With respect to the position of head in Italian compounding, Scalise and Fábregas (2010: 119) report that Italian compounds display an interesting behaviour, since they are distinguished into left- and right-headed formations as illustrated below:

(9) Right-headed compounds

N+sN³ *insettivoro* ‘insectivorous’

sN+N *logoterapeuta* ‘lit. therapy of speech’

sN+sN *grafomania* ‘graphomania’

N+N *scuola bus* ‘school bus’

(10) Left-headed compounds

A+N *rosso mattone* ‘brick red’

N+A *acqua santa* ‘holy water’

N+N *ufficio viaggi* ‘travel agency’

²This word is found in medieval texts from Southern Italy (Minas, 2003).

N+N *trasporto latte* ‘milk transportation’

Observe that Italian has both left-headed and right-headed compounds, and, as a result, one could claim that Italian compounding has no canonical head position. The analysis of the right-headed formations, however, reveals the following. The compounds *insettivoro*, *logoterapeuta*, and *grafomania* belong to the so-called *neoclassical compounds*, and *scuola bus* is a calque from the English *school bus* and it is therefore not a compound formed according to the Italian pattern. This shows that it is problematic to assert that Italian compounding is right-headed. On the contrary, all left-headed compound types in (10) are very productive and belong to the native Italian compounding patterns.

5.2.4 A case of Italian influence?

On the basis of the above, one could formulate the hypothesis that left-headedness in the Greek dialects of Southern Italy is the result of Italian influence on Italo-Greek. It has been voiced by Alessio (1953), for example, that the creation of the compound *xortanémi* which I repeat in (11) was based on the Italian *erba di vento*.

- (11) *xort-anem-i* < *xort(o) anem(o)*
 grass-wind-Infl grass wind
 ‘lit. grass of the wind, kind of grass’

If we, however, accept the view that structural compatibility⁴ must be met in order to have transfer of a rule from one language to another, it cannot be argued that the Italian formation *erba di vento* may have served as a model for the Greek left-headed compound *xortanémi* since the two formations are structurally incompatible. It is not even clear whether *erba di vento* should count as a compound.

In my opinion, if one would like to pursue the idea that this phenomenon is the result of contact between Italian and Greek, one should not base his/her hypothesis on formations such as *erba di vento*. Therefore, the of Greek origin Bovesse may have developed left-headed compounds under the influence of the robust left-headed Italian

³sX stands for ‘bound morpheme’.

⁴See Section 5.1.3 for more on this issue.

compounding and the possible source for the change in question could be the presence of left-headed [N N]_N compounds in Italian. Consider the following formations:

(12) [N N]_N Italian compounds

ufficio viaggi ‘travel agency’

scuola guida ‘driver school’

Observe that these formations are left-headed. The formation *ufficio viaggi*, for example, is a kind of *ufficio* and not a kind of *viaggi*. According to the language-interference hypothesis, such formations may have served as patterns for the creation of Greek left-headed compounds.

Before proceeding with the examination of the validity of this hypothesis, it should be mentioned that Italian has borrowed several words from Italian and that some of these loanwords are attested in the compounds of the Greek dialects of Southern Italy. Consider the following formations which combine a Greek and a Romance morpheme:

(13) *agr-o-ferudd-a* < *agr-ferudd(a)* (< *it. ferula*)

wild-LE-ferule-Infl wild ferule
‘kind of ferule’

anima-gadar-a < *anima* (< *it. anima*) *gadar(a)*

human-mule-Infl soul, human mule
‘a half-woman half-mule fairy’

larg-o-ker-i < *it. largo* *ker(a)*

wide-LE-horn-Dsuf wide/broad horn
‘animal with wide/broad horn’⁵

surv-o-mit-i < *sorv(ao)* (< *it. sorbire*) *mit(i)*

suck-LE-nose-Dsuf absorb/suck nose
‘who sucks his nose all the time’

It should be stressed, however, that despite the fact that Romance words from all major lexical categories, nouns, verbs, and adjectives, participate in the creation of Greek compounds, no incorporation of Italian compounds into Bovesese is attested. To put it bluntly, there are no Italian compound loanwords in Bovesese such as *scuola guida* on

⁵On the structure of bahuvrihi compounds see Part IV.

which a pattern for left-headed Greek compounds could be based. The absence of Italian compound loanwords in Bovesè will be of great importance for our discussion of externally-motivated change for it renders left-headedness in Bovesè a perfect candidate against the *no-rule-transfer* view.

5.3 Testing the language-interference hypothesis

In Section 5.1.3 we identified a number of factors which can facilitate or inhibit contact-change. Below, I summarize the most important of these factors:

- (a) Typological distance: the typologically closer two systems are, the more possible it is to have contact-induced change. Typological dissimilarity tends to prohibit the transfer of features.
- (b) Some grammatical subsystems are more or less amenable to change as a result of language contact.
- (c) The more transparent an element is, the more likely it is to be transferred.
- (d) The more gaps present in the recipient language, the more borrowing is facilitated.
- (e) Borrowability scales indicate that structural elements are harder to be borrowed.

In what follows I discuss the implications of these factors for the phenomenon of left-headedness in Bovesè.

First, typological congruence seems to be the most important factor in external change since it can facilitate or inhibit borrowing. Winford (2010: 178), for example, warns us that even borrowing of open-class members such as nouns could be prohibited if there is a large degree of typological distance between the source and the recipient language. This poses the following question: How similar or distinct should the involved systems be in order to facilitate or inhibit transfer?

In the case of left-headedness in Bovesè, it is not clear whether the typological make-up of Italian and Greek compounding argues for structural compatibility or structural incompatibility. A comparison between the Italiot compound *xerosikli* ‘handle of tin bucket’ and the Italian *ufficio viaggi* reveals the following: *xerosikli* is composed of two stems, namely *xer(i)* ‘hand’ and *sikl(a)* ‘tin bucket’, and, in addition, it shows the linking

element *-o-* between its constituents (i.e. *xer-o-sikli*). On the contrary, the Italian *ufficio viaggi* consists of two full word forms and shows no linking element. Another difference is that *xerosikli* is inflected at the right edge and its inflectional ending is different from that of the second constituent when the latter appears as an independent word in syntax (compare the full word form *sikl-a* ‘bucket-Infl’ to the compound *xer-o-sikl-i* ‘handle-LE-bucket-Infl’), whereas, the Italian *ufficio viaggi* allows for inflectional suffixes on both constituents even in the plural (i.e. *uffici viaggi*). To sum up, if anything, this comparison reveals that there is no availability of formal correspondence between Greek and Italian compounding and this dissimilarity militates against the hypothesis that this phenomenon should be primarily attributed to language interference.

Second, the change we observe in Bovesse-Greek compounds is a change in the linearization of constituents and, more particularly, in the head-dependent order. This means that we are dealing with a structural change which affects the core of the compounding subsystem. Much research, however, shows that structural elements which belong to the core of grammar are less susceptible to change as a result of language interference (Hickey, 2010). In addition, the “degree of integration into the system” (Thomason, 2010: 44) makes the transfer of a rule extremely difficult. Given that the rule for the position of head in compounds is deeply integrated into the system and that it is one of the most important settings which form part of the compounding system, it is very difficult to maintain the position that left-headedness is a contact phenomenon.

Third, the factor of transparency in form, meaning, and function is not relevant in this case since rules of morpheme ordering in compounds and notions such as head, belong to our unconscious knowledge of the grammatical system and have no isolated form or meaning.

Fourth, as far as the gap-filling factor is concerned, no gap which could facilitate such transfer is observed in Italiot. The Greek dialect needed not resort to the borrowing of a rule from Italian or any other language since it already had a setting for the head-dependent linearization.

Finally, the scepticism with respect to the direct transfer of morphosyntactic rules is reflected in the hierarchy of borrowability of morphological elements. As we saw in Section 5.1.3, the more bound an element is, the less possible it is to be chosen for transfer: the closer an element is to grammar, the less likely it is to be borrowed. For

example, loanwords are better candidates than derivational affixes for transfer and the latter are more likely to be borrowed than inflectional affixes. This factor also argues against the validity of the hypothesis that left-headedness is a contact phenomenon since information regarding grammatical settings (rules and constraints) is highly unlikely to be transferred.

5.3.1 When is a structural change caused by language contact?

We saw in Section 5.2.2 that in the case of left-headedness in Bovesese-Greek compounding, there are no Italian borrowed compounds which could mediate the transfer of the Left-hand Head Rule. As a result, this could be a case of a direct rule transfer and as such it would militate against the *no-rule-transfer* view. In what follows, let us provide some criteria which could help us decide whether a given change in the grammatical system of a recipient language should be considered the result of contact-induced change.

Thomason (2001: 93-94) identifies the following conditions which should be met in order to prove that a rule has been transferred directly from a language to another without the mediation of lexical borrowings:

- (a) Identify the language which might have served as the source for the change in question.
- (b) Consider the recipient language as a whole and try to find other structural changes which could be linked to externally caused change.
- (c) Find several shared features in the grammatical components of the source and recipient language.
- (d) Prove that the change in question is a true innovation and that it was not present in the recipient language before it came into contact with the proposed source language.
- (e) Show that the change in question is not an innovation in the source language and that it was present before any contact between the source and the recipient was established.
- (f) Consider any internal factor which could lead to the change in question.

The above mentioned conditions show that it is particularly difficult to prove that a change in the structural make-up of a language is due to the direct transfer of a rule from a proposed donor language. In fact, Thomason argues that in order to make a solid case for contact-induced change, all conditions must be met.

As far as left-headedness is concerned, it should be stressed that Bovesè does not meet most of these conditions and despite the fact that it has been in contact with Romance for centuries, it still retains several Greek archaic features.

5.3.2 Absence of [N A]_N and left-headedness in Greek

Besides the absence of Italian borrowed compounds in Bovesè and the no-rule-transfer view, three other factors indicate that the particular phenomenon is not primarily due to language interference. These factors are the following:

- (a) absence of [N A]_N compounds,
- (b) Italian loanwords which appear in Greek compounds follow the Greek settings for the position of head, and
- (c) presence of left-headedness in previous evolutionary stages of Greek.

First, on the assumption that Italian is the source for left-headedness, one expects that the setting for headedness in Bovesè compounding has been re-adjusted from ‘HEAD ON THE RIGHT’ to ‘HEAD ON THE LEFT’ in accordance with the robust left-headedness of Italian. In other words, it follows from the language interference hypothesis that the left-headedness of Italian has overwritten the right-headedness setting of Greek. Attributive [A N]_N compounds in (14), though, are right-headed, contrary to the left-headed Italian pattern in (15). Consider the following examples:

(14) Italiot-Greek [A N]_N compounds

kitrin-o-le-o < *kitrin(o) le(o)*
 yellow-LE-merle-Infl yellow merle bird
 ‘merle bird with yellow plumage’

mavr-o-pil-o < *mavr(o) pil(o)*
 black-LE-soil-Infl black clay
 ‘black clayey soil’

(15) Italian [N A]_N compounds*campo santo* ‘cemetery’*cassa forte* ‘safe box’

Observe that although *cassa forte* is left-headed (the whole is a noun and not an adjective, and its hyperonym is *cassa* and not *forte*), the Bovesè *kitrinolóo* is right-headed; the [N A]_N **le-o-kitrino* (merle-LE-yellow) is ungrammatical. In a similar vein, *mavrópilo* does not appear with the form **pil-o-mavro* (soil-LE-black). The right-headedness of Italiot compounds composed of an adjective and a noun militates against the language-interference hypothesis since it is not the case that Italian has caused a change of the setting for the head-nonhead linearization inside compounds.

Second, in Section 5.2.2 we presented compounds which consist of a Greek and an Italian morpheme. In (16) I repeat the compound *agroféruḍḍa* which is composed of the Greek adjective *agr-* and the Romance *ferula*:

- (16) *agr-o-feruḍḍ-a* < *agr- feruḍḍ(a)* (< *it. ferula*)
 wild-LE-ferule-Infl wild ferule
 ‘kind of ferule’

The Greek compound *agroféruḍḍa* is right-headed despite the fact that it has *ferula* as a head. In fact, the compounds of the Greek dialects of Southern Italy which have a Romance morpheme display the head-dependent order of Greek and not Italian. This holds even in those cases in which the Romance morpheme is the head, as exemplified by *agroféruḍḍa*.

Third, a closer examination of the long attested history of Greek reveals that left-headed [N N]_N compounds are present in previous evolutionary stages and in other Modern Greek dialects. Consider the following examples of left-headed [N N]_N compounds from Ancient, Koine, and Medieval Greek:⁶

- (17) *the-oin-os* < *the(os) oin(os)* A.Fr.382
 god-wine-Infl god wine
 ‘god of wine’

⁶Data comes from Liddell et al. (1968), Andriotis (1939), Karanastasis (1992, 1997), Papagelou (2001), Chatziioannou (2000), HDMG (1989), and the archive of the “Research Centre for Modern Greek Dialects and Idioms (I.L.N.E.) of the Academy of Athens”. For more data see Appendix A.

<i>kabl-o-kunar-a</i>	< <i>kabl(os) kunar(a)</i>	<i>Gp.20.31.</i>
stem-LE-artichoke-Infl	stem artichoke	
'artichoke stem'		
<i>karp-o-balsam-on</i>	< <i>karp(os) balsam(on)</i>	<i>Gal.14.166</i>
fruit-LE-balsam-Infl	fruit balsam	
'the fruit of the balsam'		
<i>kokk-o-daphn-on</i>	< <i>kokk(os) daphn(e:)</i>	<i>Paul.Aeg.3.28</i>
berry-LE-laurel-Infl	seed, berry laurel	
'laurel berry'		
<i>op-o-kinnamo:m-on</i>	< <i>op(os) kinnamo:m(on)</i>	<i>Thphr. HP4.4.14.</i>
juice-LE-kinnamon-Infl	juice kinnamon	
'juice of kinnamon'		
<i>xul-o-karpas-on</i>	< <i>xul(on) karpas(os)</i>	<i>Gal.19.738</i>
wood-LE-flax-Infl	wood flax	
'wood of flax'		

The analysis of these formations shows that they are head-initial [N N] compounds. The compound *karp-o-balsam-on*, for example, which is composed of *karpos* 'fruit' and *balsamon* 'balsam' is headed by its left-most element since the whole is a kind of *karpos* and not a kind of *balsamon* 'balsam'.

It should also be mentioned that minimal pairs of both left- and right-headed compounds are also attested (as we will see in the next chapter, this characteristic is also attested in subsequent evolutionary stages):

- (18) *gastr-o-cheir cheir-o-gasto:r* < *cheir gaste:r*
 belly-LE-hand hand-LE-belly hand belly
 'one who fills his belly with his hands, living by one's hands'
- cheir-erg-on erg-o-cheir-on* < *cheir ergon*
 hand-labour-Infl labour-LE-hand-Infl hand labour
 'manual labour'

The presence of the formations in (17) and (18) indicates that left-headed formations are already present in previous evolutionary stages of the Greek language and that the presence of left-headed [N N] compounds in Italiot could very well be linked to these

formations. In fact, words such as *fillámbelo* ‘vine leaf’ in Bovesse are quite old: *fillámbelo* appears in the lexicon of Liddell et al. (1968). It should also be noted that the same head element may appear in a number of Italiot compounds and left-headed compounds from previous evolutionary stages. Consider for example the following formations:

(19)	Previous stages	Italiot	Head
	<i>kokkódafnon</i>	<i>korkóššino</i>	<i>kókkos</i>
	‘laurel berry’	‘fruit/seed of pistacia’	‘fruit/seed’
	<i>xulokárpason</i>	<i>ššulopótamo</i>	<i>xúlo</i>
	‘wood of flax’	‘driftwood’	‘wood’

It should also be mentioned that left-headed compounds are attested in other Modern Greek dialects as well. Consider the following examples from Cypriot:

- (20) *axnar-o-pod-on* < *axnar(in) pod(in)*
 print-LE-foot-Infl print foot
 ‘foot-print’
- fill-o-krommid-on* < *fill(on) krommid(in)*
 leaf-LE-onion-Infl leaf onion
 ‘onion-leaf’
- kari-o-lem-in* < *karid(in) lem(os)*
 walnut-LE-throat-Infl walnut throat
 ‘lit. walnut of the throat, adam’s apple, carotid’
- kokkon-o-sik-on* < *kokkon(a) sik(on)*
 seed-LE-fig-Infl seed fig
 ‘fig-seed’
- kotsir-o-egi-on* < *kotsir(os) egi(a)*
 dropping-LE-goat-Infl dropping goat
 ‘goat-dropping’
- riz-aft-in* < *riz(a) aft(in)*
 base-ear-Infl root,base ear
 ‘ear-base’

stom-o-lakk-on < *stom(an) lakk(os)*
 mouth-LE-well-Infl mouth well
 ‘well-mouth’

It is of the utmost importance to note that some words which appear in Italiot are also present in other Modern Greek dialects. Words such as *rizáfti* ‘root/base of the ear’, for example, are shared by (at least) Bovese, Cypriot, the dialects spoken in Kos and Karpathos, and Pontic.⁷

In addition, the absence of left-headed [N A]_N compounds should not be considered a distinctive characteristic of Italiot since an examination of previous evolutionary stages of the Greek language shows that this kind of compounding is absent from Greek and its dialects in general. As we will see in the next chapter, a research which covers from Homer to Standard Modern Greek shows that no real [N A]_N pattern is established in Greek.

To summarize, left-headed compounds are present in other dialects and the absence of left-headed [N A]_N compounds holds for the Greek language in general. These observations clearly militate against the language interference hypothesis and show that the phenomenon of left-headedness in Italiot should not be studied independently of the same phenomenon evident in previous evolutionary stages and in other dialects.

5.4 Conclusions

This chapter was devoted to the study of possible system-external factors which could affect the head-nonhead linearization inside morphological configurations with focus on compounds. In particular, in this chapter, I raised the question whether the presence of left-headed compounds in the of Greek origin Italiot should be considered a case of contact-induced change.

Although there is evidence in favour of the idea that language interference can lead to the creation of new compound patterns and to the rise of variation with respect to the head-nonhead linearization—consider for example Vietnamese which has native left-headed and Chinese right-headed compounds—a number of factors militate against the hypothesis that left-headedness in Italiot was primarily caused by language interference.

⁷In Pontic we find the word *rizotin* which uses the form *otion* instead of *afti*.

My arguments for not adopting such a position were the following:

- (a) There is no availability of formal correspondence between Greek and Italian compounds (no typological congruence).
- (b) Structural elements which belong to the core of the grammar are less susceptible to change as a result of language interference.
- (c) No gap which could facilitate the transfer of a rule is observed in Italiot. The Greek dialect need not resort to the borrowing of a rule from Italian or any other language since it already has a setting for the head-nonhead linearization.
- (d) Borrowability scales indicate that structural elements are harder to be borrowed.
- (e) Absence of $[N A]_N$ compounds from Italiot, in particular, and from the Greek language, in general.
- (f) Italian loanwords which appear in Greek compounds follow the Greek settings for the position of head even when they are heads.
- (g) Finally (and most importantly), left-headed compounds are present in previous evolutionary stages of Greek and the Italiot compounds could be remnants of these stages.

To conclude, the hypothesis that the phenomenon of left-headedness is to be attributed to contact between Greek and Italian cannot be maintained. On the contrary, the phenomenon of left-headedness in Italiot should not be studied independently of the same phenomenon evident in previous evolutionary stages and in other dialects.

Position of head: System-internal factors

This chapter is devoted to the identification of possible system-internal factors which govern the linearization of morphemes inside compounds and which could motivate a change in the head-nonhead order. In particular, in this chapter, I present data which challenges the wide-spread idea that the order of elements in morphological configurations is always fixed. This concept of morphology which partly stems from the *Lexical Integrity Hypothesis*, has not led to any advancements in the study of the head-nonhead linearization inside compounds despite the fact that a number of well-defined compound patterns militate against such a concept.

Greek scholarship, for example, holds the view that right-headedness applies to all endocentric compounds and that Greek compounds have been right-headed since Ancient Greek (Ralli, 2013: 110). The reason, however, for which Greek compounds exhibit this particular property is hardly ever addressed. In addition, such a view makes no provision for the presence of compounds which do not follow the *Right-hand Head Rule*. In fact, a purely morphological concept of linearization inside compounds can neither predict nor explain the presence of left-headed compounds.

In this chapter, I propose that the issue of the head-nonhead linearization inside compounds should be reassessed and, most importantly, that it should not be examined in isolation from related phenomena (if any) in other morphological processes. To anticipate later discussion, one should be able to explain why we only find minimal pairs of left- and right-headed compounds, e.g. *parathir-o-fill-o* (window-LE-leaf-Infl) *fill-o-parethir-o* (leaf-LE-window-Infl) ‘casement’, but not of affixed words, e.g. *en-noble*/**noble-en*. In this chapter, I propose that the exceptionality of compounds which do not follow the “canonical” order can help us advance our understanding of the understudied issue of linearization inside compounds.

The rest of this chapter is structured as follows: in Section 6.1, I comment on the Morphology-Syntax interface and the *Lexical Integrity Hypothesis* which severely constrains the interaction between the two components. In Section 6.1.1, I present data which argues in favour of the autonomy of morphology and in Section 6.1.2, I present the phenomena of conjunction in derivation and phrasal compounding which violate lexical integrity.

Section 6.2 serves as an introduction to the diachronic relation between Morphology and Syntax. In particular, it focuses on the syntactic origins of compounding (Section 6.2.1), elaborates upon the distinction between primary and secondary compounds, and presents data from Vedic and Greek which support the idea that compounding may arise through *univerbation* from syntactic phrases.

Section 6.3 presents the very few systematic approaches which deal directly with the issue of constituent order in syntactic phrases and morphological configurations. In more detail, Section 6.3.1 presents the typological and historical works of Harris and Campbell (1995), Bauer (2001), Gaeta (2008), and Wälchli (2005). Section 6.3.2 focuses on the *Right-hand Head Rule* (Williams, 1981b), the *Head Ordering Principle* (Hawkins and Gilligan, 1988), and the idea that the linear order in any morphological configuration, derived or compound word, could be predicted by the general grammatical settings with respect to headedness (Lieber, 1992).

Section 6.4 presents data which shows that variation in the order of compound members may not only exist cross-linguistically, but also in the same language. More specifically, although Greek compounds generally obey the Right-hand Head Rule, this section presents compound patterns which are left-headed and discusses whether this charac-

teristic property should be attributed to the relation between morphology and syntax. Section 6.4.1, discusses verb-first compounds, Section 6.4.2 presents prepositional compounds, and Section 6.4.3 offers examples of left-headed adjectival compounds.

The Lexical Integrity Hypothesis has implications for the head-nonhead linearization since according to Bresnan and Mchombo (1995), morphemic order is fixed, even when syntactic word order is free. In addition, given the strict asymmetry of morphology (Di Sciullo, 2005), no variation in the ordering of morphemes is expected. Section 6.5 presents data from inflection, derivation, and compounding in an examination of whether morpheme order is amenable to change and which system-internal factors may trigger a change in the head-nonhead linearization.

Section 6.6 comments on whether there are other non-morphological settings for the linearization of compound constituents, focusing on Greek co-ordinate compounds. Finally, Section 6.7 summarizes and concludes this chapter.

6.1 On the Morphology-Syntax interface

A central issue in the study of words is the relation between Morphology and Syntax. The similarities between the two components which are especially evident in the field of compounding (Spencer, 2005: 77; Ralli, 2013: Ch. 12) and the use of shared terms and notions, such as the notion *head* which concerns us in the present thesis, have led to proposals which argue that word formation may reflect the syntactic structure of a language. In fact, some scholars have gone as far as to propose that morphology could be reduced to syntax.

A survey of the vast literature on the relation between morphology and syntax shows that the demarcation between the two components could be captured in terms of:

- (a) the ordering between morphology and syntax,
- (b) the primitives used by each component, and
- (c) the access syntax has into morphology and vice versa.

The simplest way in which this demarcation could be expressed is in the view that both the input and the output of these components differ, a view that is at least implicit in much research. According to this view, morphology combines morphemes to create

words, whereas syntax manipulates words to create phrases. This suggests a particular understanding of the relation between the two components since the difference in the primitives used by each component implies that morphology and syntax are ordered in a strict way; the assertion that the latter manipulates words, that is, the output of the former, leads to a model in which morphology operates before syntax and not vice versa. In this respect, the demarcation between morphology and syntax is absolute.

This particular ordering of the two components, that is, morphology before syntax, has consequences for the primitives used by morphology. The assertion that morphology operates pre-syntactically yields as a consequence that syntactic outputs, i.e. phrases, cannot serve as building blocks for morphological operations such as compounding and derivation. In a strict linear model, the only option for interaction between independently generated morphological and syntactic structures is *lexical insertion*, that is, the mechanism by which words are inserted in syntactic terminal nodes.

This much debated issue has led to proposals which argue for the existence of an independent morphological module (see amongst others Anderson, 1992; Aronoff, 1994) and to syntactic approaches to word-formation (Lieber, 1992; Halle and Marantz, 1993) which try to show that morphology can be reduced to syntax. Other models, usually called *word-syntactic* models, embrace the idea that although the two components are autonomous, they may interact in a number of ways, such as competition (Ackema and Neeleman, 2004). On the one hand, scholars who embrace the view that morphology is an independent module have to provide evidence for the existence of phenomena and restrictions that could only be accounted for by morphology and not by other modules such as syntax, semantics, and phonology. On the other hand, a syntactic analysis of words must use only those operations already present in phrase formation to explain the derivation of words (Borer, 1998).

An argument for reducing morphology to syntax relates to the simplification of grammar (Lieber, 1992). The argument is the following: if syntax was able to explain all word-formation phenomena, we would no longer need a separate morphological module with its own principles and idiosyncrasies; everything would be done by appealing to the same grammatical settings. Compared to a concept of grammar in which two components to explain the derivation of words, on the one hand, and phrases, on the other hand, are needed, the idea that morphology can be reduced to syntax results in a

more simplified grammar.

It should be stressed that a syntactically oriented approach to morphology must be able to handle word formation by the use of those (and only those) mechanisms and structures which are independently needed for the analysis of phrases. The postulation of word-formation specific mechanisms and structures does not lead to a simplified grammar (for a discussion see Borer, 1998). With respect to this issue, it should be mentioned that a number of scholars call our attention to the fact that “most researchers who have attempted to construct a model explicitly reducing (at least some of) WF to syntax have concluded that the task is impossible and quite possibly an undesirable one” (Borer, 1998: 157). Similarly, Di Sciullo (2005: 175) argues that “One problem with this view is the increase of the computational load of the grammar. A single syntactic derivation for both words and phrases requires additional rules to derive word-internal properties in addition to the rules deriving phrasal properties, because syntactic and morphological properties are not coextensive”. As I will show in the following sections, there are phenomena which show that morphology and syntax interact, but this does not argue in favour of a “syntax-all-the-way-down” approach to morphology.

6.1.1 On the autonomy of morphology

In what follows, I present theoretical proposals and empirical data which argue in favour of an autonomous morphological grammatical component.

To begin with, a number of principles and constraints have been proposed with respect to the morphology-syntax interface (if any). The *No Phrase Constraint*, for example, in (1), dictates that phrases cannot serve as morphological building blocks:

(1) The No Phrase Constraint

Morphologically complex words cannot be formed (by WFRs) on the basis of syntactic phrases. (Botha, 1981: 18)

As already mentioned, this constraint rests on the assumption that morphology operates pre-syntactically, and as a result it cannot use a syntactic primitive as building block.

In addition, scholars working in the realm of the Lexicalist tradition embrace some sort of the *Lexical Integrity Hypothesis* according to which syntax has no access to the internal structure of morphological configurations. In (2), I present some of the formu-

lations of the Lexical Integrity Hypothesis in morphological literature:

(2) a. Generalized Lexicalist Hypothesis

No syntactic rule can refer to elements of morphological structure.

(Lapointe, 1980: 8)

b. Atomicity Thesis

Words are “atomic” at the level of phrasal syntax and phrasal semantics. The words have “features”, or properties, but these features have no structure, and the relation of these features to the internal composition of the word cannot be relevant in syntax—this is the thesis of the atomicity of words.

(Di Sciullo and Williams, 1987: 49)

c. the syntax neither manipulates nor has access to the internal structure of words

(Anderson, 1992: 84)

d. A fundamental generalization that morphologists have traditionally maintained is the *lexical integrity principle*, which states that words are built out of different structural elements and by different principles of composition than syntactic phrases. Specifically, the morphological constituents of words are lexical and sublexical categories—stems and affixes—while the syntactic constituents of phrases have words as the minimal, unanalyzable units; and syntactic ordering principles do not apply to morphemic structures. As a result, morphemic order is fixed, even when syntactic word order is free; the directionality of ‘headedness’ of sublexical structures may differ from supralexical structures; and the internal structure of words is opaque to certain syntactic processes.

(Bresnan and Mchombo, 1995: 181-182)

e. Revised Lexical Integrity

Syntactic rules cannot alter the lexical meaning of words (including argument structure); syntactic rules have no access to the internal structure of X^0 categories.

(Spencer, 2005: 81, based on Ackerman and LeSourd, 1997)

f. The Limited Access Principle

Morphological Merge can select on a language specific basis to merge with

a phrasal/sentential unit. There is no Syntactic Merge below the word level.
(Lieber and Scalise, 2006: 21)

g. Morphological Merge

Let there be items α and β , such that α is a base and β a base or an affix. MM takes α, β (order irrelevant) and yields structures of the form $\langle \alpha, \beta \rangle \gamma$

a. where γ is an X^0 , categorically equivalent to α or β , and

b. α or β can be null. (Lieber and Scalise, 2006: 21)

Observe that in the 80's, the interaction between morphology and syntax was severely constrained by the Lexical Integrity Hypothesis (LIH) as formulated in the *Generalized Lexicalist Hypothesis* (Lapointe, 1980), the *Atomicity Thesis* (Di Sciullo and Williams, 1987), as well as the *No Phrase Constraint* (Botha, 1981). In fact, in this concept of grammatical organization no (real) interaction between morphology and syntax is allowed and no provision for such an interaction is made. The LIH as well as the No-Phrase Constraint, have been formulated in such a way as to provide an absolute demarcation of morphology and syntax. In recent work (Booij, 2005b; Lieber and Scalise, 2006), nevertheless, provision for a (limited) interaction between the two grammatical components is made.

To anticipate later discussion, Bresnan and Mchombo (1995) argue that morphology and syntax are distinct in that they use different primitives, the former manipulates stems and affixes, and the latter uses words to build phrases. They also argue that the two components are governed by different principles and settings, including the head-nonhead order which concerns us in the present thesis; for them, morphemic order is fixed, even when syntactic word order is free.

Arguments in favour of an independent morphological component come from the study of elements and phenomena which cannot be explained by syntactic, phonological, or semantic rules (Aronoff, 1994; Español Echevarría and Ralli, 2000; Maiden, 2005; Ralli, 2006b, 2008). Empty morphs such as compound markers and theme vowels have no syntactic, phonological, or semantic justification, but are needed for the creation of well-formed words.

In addition, not only the presence but also the distribution of these elements cannot be deduced from phonological, syntactic, or semantic principles. Fábregas (2011), for

example, reports that in Spanish, each of the three conjugations has its own theme vowel. Crucially for the morphology-syntax interface, no syntactic rule is able to explain the distribution of theme vowels in Spanish. Therefore, these elements support the idea that morphology is an independent grammatical component:

- (3) cant-a, beb-e, part-i
sing-ThV, drink-ThV, break-ThV

Allomorphy is another phenomenon which argues in favour of the autonomy of morphology (Booij, 1997a,b; Ralli, 2006a). Consider for example the examination of stem allomorphy and its relation to inflection. Ralli (2006a) argues that stem allomorphy is very important for the formation of morphological paradigms since it can be used to distinguish between inflection classes and lead to paradigmatic uniformity. By way of example, Modern Greek verb conjugations are based on the systematic presence or absence, of a specific allomorphic pattern of the stem. According to Ralli, the presence or absence of the allomorphy pattern $X(a) \sim X_i$ cuts across the distinction between Conjugation 1 and Conjugation 2; verbs which exhibit this pattern belong to Conjugation 2, whereas Conjugation 1 comprises verbs which do not exhibit this pattern of allomorphy. Consider the following from SMG:

- (4) graf- ‘to write’ Conjugation 1
agap(a)- \sim agapi- ‘to love’ Conjugation 2

The verb *agap(o)* ‘to love’ for example belongs to Conjugation 2, whereas *graf(o)* ‘to write’ conjugates according to Conjugation 1 since it does not exhibit this specific pattern of allomorphy. Of importance to the question of the autonomy of morphology is the fact that allomorphy cannot be explained by appealing to semantic or syntactic justification, but is nevertheless needed for the creation of morphological paradigms.¹

6.1.2 Violation of lexical integrity

A number of phenomena argue in favour of the idea that although morphology and syntax are independent components, there is interaction between the two. Conjunction in

¹The phenomenon of the *externalization of inflection* also argues in favour of an autonomous morphological component (see Section 6.5.1).

English derivation and phrasal compounding are two phenomena which violate Lexical Integrity. A caveat may be in order. These phenomena do not argue in favour of a “syntax-all-the-way-down” approach. They only show that syntax may have access to a morphological structure and that morphology may use syntactic building blocks.

To begin with, Strauss (as cited in Spencer, 2005) shows that there is conjunction in English derivation. Consider the following from Spencer (2005: 82):

- (5) a. pre- and even to some extent post-war (economies)
 b. pro- as opposed to anti-war
 c. hypo- but not hyper-glycaemic

Observe, for example, that there is conjunction in the prefixed words *pre-war* and *post-war* in (5a). Spencer notes, however, that only a limited number of prefixes (which should be rather considered ‘prefixoids’) allow for coordination since prefixes such as *un-* and *re-* never show conjunction. This phenomenon violates lexical integrity in that it shows that syntax does have access to the internal structure of words.

As mentioned above, a pre-syntactic concept of morphology yields as a consequence that syntactic outputs, i.e. phrases, cannot serve as building blocks for morphological operations. In addition, Botha’s *No-phrase Constraint*, which, as Spencer (2005) notes, is a self-violating name, dictates that no phrase can serve as building block for morphology. The phenomenon of *phrasal compounding*, however, violates this constraint (for a detailed discussion see Lieber, 1992). Consider the following examples from Lieber and Scalise (2006):

- (6) a pipe and slipper husband
 a floor of a birdcage taste
 over the fence gossip
 in a row nests
 a slept all day look
 a who’s the boss wink
 God is dead theology

Observe that these compounds consist of a noun which serves as the head of the formation and a phrasal non-head. The compound *God is dead theology*, for instance, consists of the noun *theology* which is the head and the phrase *God is dead*. Such examples clearly indicate that the Lexical Integrity Hypothesis should be revised since a syntactic primitive feeds a morphological process. In particular, in order to account for phrasal compounding (and other phenomena which violate lexical integrity) Lieber and Scalise (2006) propose the *Limited Access Principle* (2f), according to which morphological merge can select on a language specific basis to merge with a phrasal/sentential unit.

6.2 Morphology, Syntax, and diachrony

The relation between morphology and syntax is captured in Givón's (1971) principle "Today's morphology is yesterday's syntax". According to this principle, there is a diachronic relation between the two components.²

That morphology tends to preserve earlier syntactic phases and that morphological building blocks have a syntactic origin is evident in both affixal morphology and compounding. Morphological primitives, for example, may arise from various sources and cross-linguistic research has shown that free lexical items form one of the main sources for affixes. In the words of Comrie (1980: 84), "phonetic attrition of a word following another word would lead to a suffix, phonetic attrition of a word preceding another word would lead to a prefix". It is usually assumed that these free lexical items used to serve as heads in syntactic head-final phrases, these phrases via *univerbation* gave rise to right-headed compounds and the heads of these compounds served as a source for suffixes. Consider as indicative examples the suffixes *-hood*, *-dom*, and *-less* which derive from free lexical items. The suffix *-hood*, as in *childhood*, derives from the Old English *-had* 'condition, position' (from Proto-Germanic **haidus* 'manner, quality'), *-dom*, as in *kingdom*, derives from the Old English *dom* 'statute, judgment, doom', and *-less* derives from the Old English *leas* 'devoid (of)' (Haspelmath, 1992: 71).

Another example is provided by prefixes which arise from prepositions, adverbs, and the non-head position of compounds. For example, prefixes *over-*, as in *overcooked*,

²It should also be mentioned that Joseph (1980) argues that a historical account of the relationship of morphology and syntax suggests "harmony and cooperation" rather than "competition".

and *ab-*, as in *abducere*, derive from the word *over* and the preposition *ab* respectively (Booij, 2005c: 55). Consider also the Frisian prefix *witte-* ‘very’ which derives from the syntagma [*wa wit hoe* ‘who knows how’ + Adjective]. The prefixed word *witte-fier* ‘very far’, for example, arises from the phrase *Wa wit foe fier* meaning ‘Who knows how far’ (Booij, 2005c: 262).

The idea that morphology retains older syntax has led to the use of morphological structures as a guide for the reconstruction of earlier syntactic stages (Lehmann 1969: 4; Clackson 2002: 163). Anderson (1980: 56), for example, in his analysis of the Chickasaw possessive construction which displays anomalous agreement patterns, concludes that morphology does “reflect yesterday’s syntax”. In fact, Anderson (1980: 68) goes as far as to conclude that “there are some clear circumstances in which today’s syntax can be expected to become tomorrow’s morphology”.

6.2.1 On the syntactic origins of compounding

There is general agreement in the relevant literature on the compounding of the Indo-European languages that “compound” as a prototype has a syntactic origin (see Brugmann, 1889; Jacobi, 1897; Tserepis, 1902; Dunkel, 1999; Clackson, 2002; Kastovsky, 2009: and literature therein). According to this proposal, *univerbation*, that is, the combination of a multi-word expression or parts of it, for semantic, morphological or phonological reasons, into a new single word under a single accent, gave rise to the process of compounding. To adduce an example, one might take into inspection the rise of nominal compounds in Germanic which, according to Booij (2005c: 261), has its roots in syntactic $[N_{\text{-GEN}} N]_{\text{NP}}$ phrases as in (7):

- (7) a. (*des*) *her-en* *huis* > *her-en-huis*
 (the-GEN) lord-GEN house.NOM lord-LE-house
 ‘mansion’
- b. (*des*) *konink-s* *kroone* > *koning-s-kroon*
 (the-GEN) king-GEN crown.NOM king-LE-crown
 ‘royal crown’

Notice that this particular univerbation has led to a compounding system with a linking element in Germanic.

This desyntactization process gave rise to two formally distinct compounding types; *παράθετον* (*unechte* or *secondary compound*) and *σύνθετον* (*echte* or *primary compound*). The difference between these two categories lies in the form of the compound constituents. In the former, i.e. secondary compounds, the relation between the constituents is marked by inflection on either the first or the second constituent, whereas, in the latter type, the first constituent appears in a root or a stem form. Compare the secondary *Helle:spondos* and *halosachne:* to the primary (stem-) compounds *kapn-odocheion* and *elaioparochos:*

(8) Secondary compounds

- a. *Helle:s-pont-os* < *Hell(e:) pont(os)*
 Helle.GEN-sea-Infl Helle sea
 ‘sea of Helle’
- b. *halos-achn-e:* < *hal(s) achn(e:)*
 sea.GEN-foam-Infl sea foam
 ‘sea-foam’

(9) Primary compounds

- a. *kapn-o-dochei-on* < *kapn(os) dochei(on)*
 smoke-LE-holder-Infl smoke holder
 ‘smoke-receiver’
- b. *elai-o-paroch-os* < *elai(a) paroch(os)*
 oil-LE-provider-Infl olive provider
 ‘purveyor of oil’

As evident from these examples, contrary to secondary compounds, the relation between the constituents of primary compounds is not flagged by inflection. Observe, for example, that the first constituent of *kapn-o-dochei-on* appears in its stem form, *kapn-*, and not in the genitive *kapn-ou* (smoke-GEN) as in its corresponding phrase *kapnou docheion* ‘smoke.GEN receiver.NOM’. The secondary compound *Helle:s-pontos*, however, has a fully fledged word as its first constituent. This can be explained if we compare this compound to the phrase *Helle:s pontos* ‘sea of Helle’ (Helle.GEN sea) from which it originates.

The difference in form (root/stem vs internal inflection) between primary and secondary compounds is usually explained by assuming that primary and secondary compounds reflect two distinct diachronic layers (Kastovsky, 2009). Primary compounds are considered to be older than secondary compounds and it is assumed that they arose via desyntactization in a pre-inflectional period. This evolutionary stage must have been characterized from independent roots and roots which needed the addition of a stem-formative in order to serve as words in syntax. In addition, the absence of inflection means that the function of nominals in syntax was given by their position in syntactic constructions. On the contrary, it is assumed that secondary compounds are a more recent category which arose in a period when Indo-European had already developed inflection.

The proposal that IE went through a stage with no inflection and that the first element of stem-compounds is really endingless is rejected by Dunkel (1999) who claims that: “[...] univerbations of various types represent not only the youngest level of composition [...] but also the oldest. [...] the IE principle of stem-composition arose through met-analysis of univerbations whose first elements had morphosyntactically zero endings” (*ibid.*, 50).

To conclude, much work on the origins of compounding highlights the relation between syntax and morphology. In addition, it shows that the difference between primary (*σύνθετον*) and secondary (*παράθετον*) compounds lies in the form of their constituents and not in the process which gave rise to them. In the following sections, I provide evidence which argues in favour of the relation between phrases and compounds.

6.2.1.1 Secondary compounds

Secondary compounds in Greek can be categorized according to the form of their respective constituents into two categories as follows:

- (a) (true) univerbations: compounds which are composed of two elements which can be found with the same form as independent words in syntax, and
- (b) compounds in which the second constituent appears in a form which is not used in syntax as such.

Although it is usually assumed that in secondary compounds only the first constituent bears inflection, the first category, i.e. (true) univerbations, can be further divided into two sub-categories based on the position of inflection. This criterion divides (true) univerbations into (a) compounds with inflection on the first constituent and (b) compounds with inflection on the second constituent (for a detailed analysis of these formations and for more data see Tserepis, 1880, 1902; Debrunner, 1917). Consider the following examples:

(10) Inflection on the first constituent

- a. *douri-klut-os* < *dor(u) klut(os)*
 spear.DAT-famed-Infl spear famed
 ‘famed for the spear’
- b. *kunos-our-a* < *ku(o:n) our(a)*
 dog.GEN-tail-Infl dog tail
 ‘dog’s tail’ dog.GEN tail

(11) Inflection on the second constituent

- a. *pr-ourgou* < *pro erg(on)*
 for-service.GEN for deed, service
 ‘serviceably, conveniently’
- b. *ep-ekeina* < *epi ekein(on)*
 towards-remote.ACC towards the_more_remote
 ‘on yonder side, beyond’

The examples in (10) show that the first constituent appears in a fully inflected form; in *douri-klut-os*, the first constituent appears in dative and *kunos* in *kunos-our-a* bears a genitive marker.

The formations in (11) are adverbs composed of a preposition and a noun. These adverbs were created by the univerbation of syntactic phrases in which the preposition governed the noun. For example, *pr-ourg-ou* originates from the phrase *pro ergou*, in which the noun appears in the genitive case. The inflectional suffix on the right edge of the formation is not to be considered a case ending of the whole compound since these

formations are adverbs and are not inflected; the inflectional suffix belongs to the right constituent and it marks the relation of the noun with the governing preposition.³

Secondary compounds in which the second constituent appears in a form which is not used in syntax are usually considered to be a hybrid category since they display properties of both secondary and primary compounds. Consider the following indicative examples:

- (12) a. *noun-eche:s* < *nou(s) ech(o:)*
 mind.ACC-who_has mind have
 ‘sensible’
- b. *hodoi-poros* < *hod(os) peir(o:)/per(ao:)*
 road.LOC-who_runs_through road run through
 ‘traveller’

As in (true) univerbations, the relation between the first and the second constituent is marked by inflection on the first constituent. For example, in *noun-eche:s* ‘sensible’, the first constituent appears in accusative as in the phrase *noun echein*⁴ ‘(mind.ACC have) to have sense’, from which it originates. The same formation, though, exhibits properties of primary compounds since its second constituent appears in the form **eche:s* which is not attested as an independent word in syntax. These formations could be seen as a transitional stage from secondary to primary compounds (and from syntax to morphology) in that the second constituent which is the head of the formation acts as a governor, i.e. the element which determines the form of the governed constituent which appears as its sister, and at the same time appears in a form unique to morphology.

6.2.1.1.1 Inflection on the first constituent Secondary compounds, that is, compounds in which an inflectional suffix flags the relation between the constituents, manifest themselves in several languages. Consider the Vedic examples below (for more data and justification see amongst others Tserepis, 1902; Dunkel, 1999):

³A more recent adverb, namely *ek-stomat-os* ‘from-mouth-GEN, lit. from the mouth, verbally, orally’ (Kriaras, 1969), is also a univerbation from the phrase *ek stómatos* which consists of the preposition *ek* ‘from’ and the noun *stóma* ‘mouth’ which appears in Genitive.

⁴For the use of this phrase with the meaning ‘to have sense, be sensible’ see authors such as Sophocles (*S.Tr.553*), Aristophanes (*Ar.Ra.53*), and Plato (*Pl.Ti.68b*).

(13) **ACCUSATIVE**

puram-dará ‘destroyer of strongholds’, *vājam-bjará* ‘carrying off the prize or booty’, *abhayam-kará* ‘causing safety’, *pushṭim-bhará* ‘bringing prosperity’, *agnim-indhá* ‘who kindles the fire’

(14) **LOCATIVE**

divi-jā ‘heaven-born, celestial’, *savye-shṭhr* ‘charioteer’, *rathe-shṭhá* ‘warrior fighting from chariots’, *agre-gá* ‘going in front’, *apsu-kshít* ‘dwelling within the clouds’, *vane-sháh* ‘prevailing in woods’, *apsu-já* ‘born in the waters’

(15) **INSTRUMENTAL**

dhiyā’-vasu ‘rich in devotion’, *girā-vr’dh* ‘delighting in or thriving by praise’

(16) **GENITIVE**

rāyás-kāma ‘desirous of property’, *anhasas-patí* ‘lord of perplexity’

Two important observations could be made. First, the analysis of these compounds reveals that the non-head element can bear a variety of cases; accusative, locative, instrumental, and genitive. Second, it is important to note that not only singular but also plural suffixes can appear on the first constituent. For example, *rathe-shṭhá*, on the one hand, bears locative singular and *apsu-* in *apsu-já*, on the other hand, is the locative plural of *ap-* ‘water’.

In what follows, I present secondary compounds with inflection on the first constituent from Ancient Greek (for more data and justification see *Monro, 1891; Tserepis, 1902; Schwyzer, 1953; Risch, 1974; Dunkel, 1999*) :

(17) **GENITIVE**

Dios-kouroi ‘the sons of Zeus, Castor and Polydeuces’, *dios-dotos* ‘given by Zeus, heaven-sent’, *kunos-oura* ‘dog’s-tail’, *oudenos-o:ros* ‘worth no notice or regard’, *Peloponne:sos* ‘Peloponnesus’, *des-pote:s* ‘the master of the house’

As already mentioned, stem-compounds and univerbations are usually considered to belong to different diachronic layers. The very old univerbation, *des-pote:s = *dems-poti-*, however, blurs the chronological distinction between primary (stem-) and secondary

compounds. This compound exhibits the archaic form **dem-s* (house-GEN) and shows that at the same evolutionary stage both primary and secondary compounds were possible.

Consider now examples of univerbations with a first constituent in the accusative:

(18) **ACCUSATIVE**

noun-eche:s ‘with understanding, sensible, discreet’, *mogos-tokos* ‘goddess of birth-pangs’, *gala-the:nos* ‘sucking, young’, *dikas-polos* ‘one who gives law, judge’, *atala-phro:n* ‘tender-minded’, *pho:s-phoros* ‘bringing or giving light’

In these examples, the first constituent which serves as the internal argument of the deverbal head appears in accusative. For example, *pho:s* in *pho:s-phoros* is in the accusative (Tserepis, 1902: 104) and satisfies the role of the internal argument of *-phoros* ‘who brings’. Accusative also appears inside univerbations such as *pod-argos* ‘foot swift’ and *koruth-aiolos* ‘with glistening helmet’ (Tribulato, 2006).⁵

Some indicative examples of univerbations with locative, which is the most frequently attested case in univerbated formations, are given below:

(19) **LOCATIVE**

hodoi-poros ‘wayfarer, traveller’, *orei-bate:s* ‘mountain-ranging’, *Puloi-gene:s* ‘born in Pylos’, *pulai-machos* ‘fighting at the gate’, *mesai-polios* ‘half-grey, grizzled, i.e. middle-aged’

One must also mention some quite old univerbations with instrumental. For example, the first constituent of *iphi-gene:tos*, is the instrumental of *is* ‘strength, force’:

(20) **INSTRUMENTAL**

iphi-gene:tos ‘produced by might’, *iphi-geneia* ‘strong-born, mighty’

Instrumental is also attested in Mycenaean as the *-pi* found in *wi-pi-no-o* shows. In this example, the first constituent is *Iphi-* ‘with might’ (Meissner and Tribulato, 2002: 304).

I present univerbations bearing nominative last for, contrary to univerbations with genitive, accusative, locative, and instrumental, these formations necessarily belong to attributive compounds since nominative is not expected to appear in compounds in

⁵It should be noted that the origin of *pod-argos* is the syntagm *kunes podas argoi* ‘dogs at the foot swift’ from Homer (*Iliad* 18.578).

which the relation between the constituents is one of subordination. Therefore, these univerbations consist of an adjective in nominative which modifies the head which is, usually, in nominative as well. *Hiera-polis* ‘sacred city’, for example, is composed of *Hiera* ‘sacred.NOM’ and *polis* ‘city.NOM’.

(21) **NOMINATIVE**

Hiera-polis ‘sacred city’, *Nea-polis* ‘new city’, *trite:-morios* ‘equal to a third part’, *kranae:-pedos* ‘with hard rocky soil’, *akra-cholos* ‘quick to anger, irascible’

A caveat may be in order. The link between compounding as a prototype and syntactic phrases does not mean that all compounds derive directly from phrases. It only means that new compounds are created on the basis of established compounding patterns from desyntactized syntagms. In addition, it is not the case that all new compounding patterns necessarily have a syntactic origin; syntax is the source for compound as a prototype, but new compounding patterns may originate from other sources as well. Nicholas and Joseph (2009), for example, argue that Greek [V V] dvandvas come from post-classical nominal dvandvas by back-formation plus reanalysis (on this issue also see Wälchli, 2005; Kiparsky, 2009; Ralli, 2009a).

6.3 Constituent order in Syntax and Morphology

The aim of this section is to present some of the few accounts which directly tackle the issue of whether there is a relation in the order of constituents of phrases and words. Historical and typological research is presented in Section 6.3.1 and formal accounts are surveyed in Section 6.3.2.

6.3.1 Historical and Typological research

6.3.1.1 Harris and Campbell (1995)

In their examination of the historical development of syntax, Harris and Campbell (1995: 201) mention that “There is no doubt that many compounds in many languages do have the same order found in contemporaneous phrases”, but also report that this is not always the case, since there are languages where compound constituent order differs from that of

syntactic word order. Lehmann's (1969) analysis of Vedic Sanskrit in (22), for example, argues for a correlation between syntactic and morphological linear order:

(22) a. *yád ékena krátunā vidámse vásu (Rigveda 2.11.11)*

‘since with a single desire you obtain for yourself wealth’

b. *tvám tyátprañināṃ vido vásu (Rigveda 9.111.2)*

‘you found that wealth of the Pani’s’

c. *vindáte vásu (Rigveda 6.51.16)*

‘(and) finds wealth’

Lehmann (1969: 13)

According to Lehmann, the compound *vidád-vasu* ‘gaining wealth’ shows the same order as the phrases in (22). Observe that all phrases in (22) and the compound in question exhibit [V N] order.

6.3.1.2 Bauer (2001)

Bauer (2001) in his typological research uses a sample of 36 languages (6 languages for each large geographical area: Africa, Eurasia, Southeast Asia and Oceania, Australia-New Guinea, North America, and South America).

Bauer examines whether there is a correlation between the order of [modifier noun + head noun] in nominal compounds and (a) [adjective + noun] and (b) [possessed noun + head noun] order in syntax. With respect to the former hypothesis, he reports that irrespective of the noun-adjective order in syntax, compounds usually exhibit [non-head + head] order. As far as the second hypothesis is concerned, he claims that there is better correlation between the order of [modifier noun + head noun] in nominal compounds and [possessed noun + head noun] in syntax.

Finally, Bauer concludes that “The order of modifying and head element in a compound most often seems to reflect the order of possessor and possessed in noun phrases, but the order of modifier and head is frequently variable in compounds” (*ibid.*, 705). To anticipate later discussion, there seems to be a relation between Greek left-headed compounds and the possessor-possessed order in noun phrases.

6.3.1.3 Gaeta (2008)

In another typological survey, focusing on both the synchronic and diachronic aspect of this issue, Gaeta (2008) uses a sample of 50 languages from a wide number of language families and offers the most comprehensive typological research on the question of correspondence between word- and morpheme order in compounds. In more detail, Gaeta uses his sample to test the following two hypotheses:

- (a) Hypothesis 1 (from Harris and Campbell, 1995: 203): In language L, the order of words in compounds that are coined at time t_i is the same as the order of words used in phrases at some time before t_i .
- (b) Hypothesis 2: In language L, the order of words in compounds that are coined at time t_i is likely to be completely independent from the order of words used in phrases at time t_i or at some time before t_i and it obeys purely morphological principles. (Gaeta, 2008: 123)

According to Hypothesis 2, the head-nonhead order in compounds is purely morphological and it only obeys morphological principles; syntactic principles are of no relevance. On the contrary, although Hypothesis 1 may not be of great value for the reconstruction of earlier syntactic word order, it has major consequences for the morphology-syntax interface since if this hypothesis holds true, the linearization of compounds is not purely morphological.

Gaeta concludes that there seems to be a true correspondence between syntactic word order and constituent order in compounds. He also claims that a change in syntax could affect the order in compounds (*ibid.*, 135) but that the internal “constituent order in compounds does not seem to change autonomously from syntax” (*ibid.*, 137). This means that it is not possible to find changes in the head-nonhead order of compounds without previous syntactic change.

6.3.1.4 Co-compounds and Coordination (Wälchli, 2005)

The idea that compounds have a syntactic origin is further supported by the relationship between co-compounds and coordination. The study of Wälchli (2005) shows that (at least some) languages develop co-compounds through condensation from coordination.

Wälchli calls the diachronic process of the development of compounds out of phrases the *condensation hypothesis* that reads as follows:

(23) **Condensation hypothesis about the origin of compounds:**

Patterns of compounds always derive diachronically from semantically corresponding syntactic constructions. Thus, sub-compounds diachronically derive from phrases consisting of a head and a dependent noun, N-Adj compounds derive from phrases consisting of a head noun and an attributive adjective, co-compounds derive from coordinate phrases, object incorporation derives from phrases consisting of a verb and an object, etc. (Wälchli, 2005: 246)

As a characteristic example which fleshes out this hypothesis consider the presence of the proprietive suffix *-li/-ly* in the Turkic Tatar. This suffix is present not only in co-compounds (24a) but in phrases (24b) as well:

(24) a. *ata.ly-ul.ly*

father.PROP-son.PROP
‘father and son’

b. *adiγ.li toγuz.li art üzä soquš.miš är.miš*

bear.PROP wild_boar.PROP pass on met.VN be.VN

‘A bear and a wild boar had been fighting in a mountain pass.’

In addition, other languages retain a linking element which historically relates to ‘and’, as the Danish compound in (25) illustrates (Bauer, 2001: 699):

(25) *saft-e-vand*

juice-and-water
‘diluted cordial’

The presence of formations which show a linking element which can be traced back to ‘and’ corroborates the idea that there is a relation between compounds and phrases.

6.3.2 Formal accounts of the position of head

In what follows, I deal with three main approaches to the position of head in morphology, namely, (a) the asymmetric account which follows from the Right-hand head rule (Williams, 1981b), (b) the *Head Ordering Principle* (Hawkins and Gilligan, 1988), and

(c) the idea that the position of head in morphology follows from general grammatical (syntactic) settings (Lieber, 1992).

6.3.2.1 The Right-Hand Head Rule (Williams, 1981)

As presented in Chapter 2, the notion head was firstly introduced into morphology by Williams (1981b) with his Righthand Head Rule. According to the RHR, the head is identified positionally as the rightmost element. From this follows that elements on the left-hand side are not heads. Consequently, suffixes are always heads, whereas prefixes are always non-heads. With respect to compounding, Williams' asymmetric account yields as a consequence the proposal that all compounds are right-headed.

Williams' proposal has been heavily criticized in the literature, since there are several languages whose compounds are left-headed and a number of authors (Lieber, 1980, 1992; Selkirk, 1982; Scalise, 1992) have provided evidence from several languages arguing against the RHR with respect to compounding. For example, Italian has robust left-headed compounding as exemplified by the examples below:

- (26) a. N+A *acqua santa* 'holy water'
 b. N+N *ufficio viaggi* 'travel agency'
 c. N+N *trasporto latte* 'milk transportation'

The presence of left-headed Italian compounds challenges the validity of Williams' idea that the head should always be identified with the rightmost element in any given word. Of importance to our study is that the RHR certainly favours a purely morphological account of the head-nonhead order; the head in morphology is always on the right and it is fixed.

6.3.2.2 The Head Ordering Principle

Hawkins and Gilligan (1988)⁶ set out to examine why suffixation is attested in the languages of the world with higher frequency compared to prefixation or infixation. Their research argues for a linkage between ordering in morphology and syntactic word order,

⁶The analysis of Hawkins and Gilligan (1988) could have been presented in Section 6.3.1 since it is a typological work. I have chosen to present it in this section because it makes a specific strong claim with respect to the head-nonhead order in syntax and morphology.

in that, (a) languages with VO and/or Pr + NP word order are expected to exhibit prefixation and/or suffixation and (b) languages with OV and NP + Po syntax are exclusively suffixing. These observations had already been formalized by Greenberg (1966) in his Universals 26 and 27 which read as:

(27) Universal 26: If a language has discontinuous affixes, it always has prefixing or suffixing or both. (Greenberg, 1966: 92)

(28) Universal 27: If a language is exclusively suffixing, it is postpositional; if it is exclusively prefixing, it is prepositional. (Greenberg, 1966: 93)

What is of importance to the relation between morphological and syntactic linearization is that in his Universal 27, Greenberg states that a language such as Thai which lacks suffixation and exhibits prefixes only, is necessarily head-initial.

Based on the work of Greenberg, Hawkins and Gilligan (see also Hawkins and Cutler, 1988) use a larger set of languages the examination of which yields a correlation between morphology and syntax. This correlation is based on the notion head. In fact, they claim that morphological elements can be divided into heads and modifiers (Hawkins and Gilligan, 1988: 226); this idea also appears in Lieber (1992). This relation between syntactic and morphological linearization based on the notion head has been formulated as follows:

(29) *The Head Ordering Principle (HOP)*

The affixal head of a word is ordered on the same side of its subcategorized modifier(s) as P is ordered relative to NP within PP, and as V is ordered relative to a direct object NP. (Hawkins and Gilligan, 1988: 227)

It follows from the HOP that head-initial languages have prefixation and, in a similar vein, head-final languages are suffixing. The HOP though cannot explain the skewing towards suffixation which manifests itself in both head-initial and head-final languages. Therefore, Hawkins and Gilligan propose a set of counterprinciples in order to explain why suffixation is preferred over prefixation cross-linguistically. One of these counterprinciples derives from psycholinguistic research on word production and comprehension which argues that the onset (the first portion) of a word is the most salient part of it and that listeners process stems prior to affixes. A corollary of these factors is that the

order stem + affix “reflects the order of computation for stem and affix in processing” (Hawkins and Gilligan, 1988: 240), whereas, the prefix + stem order is disfavoured.⁷

To summarize, the *Head Ordering Principle* argues in favour of a correlation between the head-nonhead linearization in both morphology and syntax.

6.3.2.3 General grammatical settings (Lieber, 1992)

As discussed in Section 6.3.1, typologically and historically oriented surveys indicate that there is a relation between the linear order in compounds and syntactic phrases. To the best of my knowledge, the only scholar who directly tackles the issue in question in the generative tradition is Lieber (1992). Lieber raises the question whether the linear order in any morphological configuration, derived or compound word, could be predicted by the general grammatical settings with respect to headedness and in an effort to do so, she modifies the principles of the X-bar Theory so that they can account for the derivation of both phrases and words.

Lieber’s main idea is that if the position of head for morphological configurations can be predicted, instead of stipulated, by the general principles of grammar, we no longer need a separate morphological component: morphology and syntax can be reduced to a single set of structural principles with parameters that are set only once for each language (*ibid.*, 26). In fact, she states that “The position of the head of a word is inextricably linked to the position of the head of a phrase, and vice versa” (*ibid.*, 40).

In order to support her idea, she presents data from several languages, including Tagalog, English, and Dutch. Lieber’s proposal can account, for example, for the robust left-headedness of Tagalog since this is a language where the head is always initial with respect to complements, specifiers and modifiers (Lieber, 1992: 40-41):

(30) Complements

a. *NP mambabasa ng diyaryo*

‘reader (of) newspapers’

b. *AP bigay para sa bata*

‘suitable for the child’

⁷For a critical assessment of the HOP and Hawkins and Gilligan (1988), see Hall (1992).

c. *PP nasa kusina*

‘in the kitchen’

(31) Modifiers

NP libro-ng nasa mesa

book on table

‘the book on the table’

(32) Specifiers

AP gutom nang kaunti

hungry rather

‘rather hungry’

Therefore, given that complements, specifiers and modifiers in this language follow their heads, it follows that Tagalog morphology is left-headed; the licensing conditions as they are set for Tagalog clearly favour a head-initial structure for both words and phrases. As a corollary of this, affixation should be heavily based on prefixes and the head in compounding should be on the left-hand side. Consider the following from Lieber (1992: 44):

(33) a. Prefix *taga-*: *b-um-ili* ‘buy’ > *taga-bili* ‘buyer’

b. Prefix *ma-*: *bigat* ‘weight’ > *ma-bigat* ‘heavy’

Left-headedness is also manifested in the compounding system of the language in question. Consider the following from Lieber (1992: 46):

(34) a. *matang-lawin*

eyes hawk ‘keen eyes’

b. *isip-lamok*

mind mosquito ‘weak mind’

c. *amoy-isda*

smelling fish ‘fishy smelling’

Observe that the compounds in (34) can be used as counterexamples to Williams' RHR, since they are left-headed.

It should be mentioned that the analysis offered by Lieber who entertains the idea that there is a relation between constituent order in syntax and morphology, can take into account not only languages which exhibit right-headedness, but those with left-headed configurations as well.

6.4 Left-headed compounds in Greek

In Section 6.2.1, we argued that compounds have a possible syntactic origin, in that a univerbated syntactic phrase may serve as a model for the creation of compounds. In addition, as presented in Section 6.3, historical, typological, and synchronic research shows that there might be a correlation between syntactic and morphological order of constituents. The purpose of this section is to present data which argues in favour of this correlation.

The majority of Greek compounds is right-headed but the reason for which Greek has right- and not left-headed compounds is rarely addressed by scholarship. Frankly, seldom does this question arise in the examination of the compounding system of any language. The right-headedness of Greek [Noun Noun] and [Adjective Noun] compounds can be better explained if a link between the head-dependent order in syntax and morphology is established. This is at least the explanation which is offered by scholars such as Tserepis (1902) and Andriotis (1939) who argue that the right-headedness of the Ancient Greek *de:m-o-gero:n* 'people-LE-elder, elder of the people' reflects the syntactic order dependent-head which is evident in the corresponding phrase *de:mou gero:n* 'people.GEN elder.NOM, elder of the people'.

In order to strengthen this position we could also present data from univerbations displaying the same dependent-head order. Consider for example the very old **dempoti-* 'house.GEN-lord, lord of the house' and *Dios-kouroi* 'Zeus.GEN-sons, the sons of Zeus'. These formations which are true univerbations, have a fully inflected form as a first constituent and preserve the syntactic order modifier-head.⁸ In a similar vein, univerbations consisting of an adjective which modifies the head element as in *Hiera-*

⁸Also, take into consideration the Germanic data in (7) from Booij (2005c).

polis ‘sacred.NOM-city, sacred city’ exhibit the same dependent-head order.

On the assumption that compounds have a syntactic origin and that desyntactization could lead to the introduction of new compounding patterns, one expects to find variation in the position of head. This variation could result from the desyntactization of phrases which exhibit different settings for the head-dependent order. In what follows, let us examine whether such a variation manifests itself in Greek data. To anticipate later discussion, under a purely morphological analysis, no variation is expected since all compounds must obey the same fixed morpheme order.

Although [Noun Noun] and [Adjective Noun] compounds in Greek generally exhibit right-headedness, there are compound patterns the head of which is located on the left-most edge of the formation. Such patterns include:

- (a) Compounds of the type *arche-laos* ‘lead-people, leading the people’ with a verb as first constituent.
- (b) Homeric prepositional compounds such as the formation *en-oikios* ‘in-house, who is in the house’.
- (c) Compounds composed of an adjective with governing properties as in *iso-theos* ‘equal-god, equal to the gods’.

The presentation of these patterns in the following sections can inform our discussion on the head-nonhead linearization and morpheme order.

6.4.1 Verb-first compounds

The category of verb-first compounds in Greek, and especially in Homer, shows variation with respect to the linearization of morphemes since the verbal element may appear either on the left- or on the right-most edge of the compound.⁹ This behaviour is of course inconsistent with a concept of morphology in which the order of constituents is fixed. Consider the following formations in which the verbal element appears in first (35a) or second position (35b):

⁹On the morphological status of the verbal element (e.g. imperative, third person singular) see Tserepis (1902), Andriotis (1939), Dunkel (1992, 1999), Meissner and Tribulato (2002).

- (35) a. *phere-oik-os* < *pher(o:)* *oik(os)*
 carry-house carry house
 ‘carrying one’s house with one, i.e. snail’
- age-leie:* < *ag(o:)* *lei(a)*
 drive-spoil lead, drive spoil
 ‘driver of spoil, the forager’
- arche-laos* < *arch(o:)* *la(os)*
 lead-people lead people
 ‘leading the people’
- eche-phro:n* < *ech(o:)* *phr(e:n)*
 have-mind have mind
 ‘sensible, prudent’
- b. *gaie:-ochos* < *gai(a)* *ech(o:)*
 earth-who_has earth have
 ‘earth-carrying’
- elaphe:-bolos* < *elaph(os)* *ball(o:)*
 deer-who_shoots deer shoot
 ‘shooting deer’
- boule:-phoros* < *boul(e:)* *pher(o:)*
 council-who_brings counsel bring
 ‘counselling, advising’
- hippo-machos* < *hipp(os)* *mach(omai)*
 horse-who_fights horse fight
 ‘fighting on horseback’

Observe that although some compounds share the same verbal element, they nevertheless exhibit different order of morphemes. The compounds *phere-oikos* and *boule:-phoros*, for example, share the verb *phero:*, but in the former, the verbal element appears as first constituent, whereas in the latter, it appears on the right. In order to provide an answer to this issue, Raftopoulou (2005: 93-101) argues that the variation with respect to the position of the verbal element should be attributed to variation in syntax. This

means that the lack of a fixed order in syntax is responsible for the presence of compounds in which the verbal element appears in both first and second position.

It should be noted that verb-first compounds exist in SMG and its dialects as well. Consider the following examples from SMG (Ralli, 2013: 182):

- (36) *mis-o-ginis* < *mis(o) gin(i)*
 hate-LE-woman hate woman
 ‘who hates women’
- fil-o-sofos* < *fil(o) sof(ia)*
 love-LE-wisdom love wisdom
 ‘philosopher’
- xas-o-dikis* < *xan(o) dik(i)*
 lose-LE-trial lose trial
 ‘trial loser (lawyer)’
- alaks-o-thriskos* < *allaz(o) thrisk(ia)*
 change-LE-religion change religion
 ‘who has changed religion’

Ralli (2013) argues that compounds such as *filósofos* were inherited from Ancient Greek and that the Modern Greek verb-first compounds were created analogically to these compounds.

Although one could argue that compounds such as *xasodikis* were formed analogically to Ancient Greek compounds, I am of the opinion that we should analyze verb-first compounds as a category on their own.¹⁰ Evidence for this comes from several verb-first compounds from previous evolutionary stages and Modern Greek dialects which cannot be related with the Ancient Greek left-headed pattern. Consider the following:

- (37) *glif-o-piatas* < *glif(o) piat(o)*
 lick-LE-plate lick plate
 ‘who licks plates’
- dixn-o-kolis* < *dixn(o) kol(os)*
 show-LE-rear show rear
 ‘who shows off his rear’

¹⁰For a discussion of rules, schemata, and analogy the reader is referred to Booij (2010).

dern-o-thira < *dern(o)* *thir(a)*

knock-LE-door hit, knock on door
‘beggar-woman’

pet-o-neri < *pet(o)* *ner(o)*

throw-LE-water fly, throw water
‘fountain’

ruf-o-galis < *ruf(o)* *gal(a)*

suck-LE-milk suck milk
‘animal which retains its milk during milking’

skorp-alevru < *skorp(o)* *alevr(i)*

scatter-flour scatter flour
‘flour wastrel’

sfogg-o-kolarios < *sfogg(o)* *kol(os)*

wipe-LE-butt wipe butt
‘who wipes the butt (of the king), Groom of the Stool’

trem-o-xeris < *trem(o)* *xer(i)*

tremble-LE-hand tremble hand
‘with trembling hands’

trip-o-dendris < *trip(o)* *dendr(o)*

pierce-LE-tree pierce tree
‘woodpecker’

dakkann-o-muttas < *dakkann(o)* *mutt(i)*

bite-LE-nose bite nose
‘who bites noses, kind of lizard’

The fact that several different verbs appear in first position shows that verb-first compounds could very well not be accounted for by analogy and that this category may not just be a pattern inherited from Ancient Greek.

Be that as it may, the fact that these formations exhibit a verb in first position argues against a concept of morphology in which the order of morphemes is fixed. If that was the case, verb-first compounds would not have arisen.

In order to address the particular constituent order evident in these compounds, one could propose that these formations are verb-first because of the relation between them and syntactic phrases. The Cypriot compound *dakkannomúttas* ‘lit. who bites noses, kind of lizard’, for instance, might be related to the phrase in (38):

(38) *Aftós pu dakkánni múttes.*

‘He who bites noses’

A comparison between the compound *dakkanomúttas* and the phrase in (38) shows that in both cases we have a head-dependent order. A similar analysis could be proposed for the remaining compounds in (37). The compound *glifopiatás*, for instance, could be linked to the phrase *Aftós pu glifi to piáto tu* ‘who licks his plate’ in which the verb precedes its internal argument, in this case the noun *piáto* ‘plate’.

To sum up, verb-first compounds show that variation inside the same language may exist and that a factor which may trigger this variation is syntactic word order.

6.4.2 Homeric prepositional compounds

The idea that univerbation of a syntactic phrase may lead to the creation of a new compounding pattern which retains the linear order of its source, may be corroborated by the presence of formations composed of a preposition and a noun governed by it. Consider the following univerbated adverbs (see also the examples in (11)) :

- (39) a. *epi-pan* < *epi pan*
 on-whole.ACC upon, on whole
 ‘in total’
- b. *epi-schero:* < *epi scher(os)*
 on-line.DAT upon, on line
 ‘in a row’

These adverbs were created by the univerbation of syntactic phrases in which the preposition governed the noun. For example, *epi-pan* originates from the phrase *epi pan* (on whole.ACC), in which the noun appears in the accusative. Similarly, in the univerbation *epi-schero:* the noun *sch(er)os* appears in dative. As mentioned in Section 6.2.1, the inflectional suffix in these formations marks the relation of the noun with the governing preposition and it is not a marker of agreement with other elements in syntax.

Even more clearly, Homeric prepositional compounds show the relation between the morphological and the syntactic components. According to Tserepis (1902: 201) the compounds in (40) originate from corresponding syntagms:¹¹

(40) *agchi-theos* < *agchi the(os)*

near god

‘who is near the gods’

ein-alios < *en al(s)*

in, on sea

‘in, on, of the sea’

pro-thuron < *pro thur(a)*

before, forth door

‘lit. before the door, front-door, door-way’

ep-arouros < *epi arour(a)*

on earth, ground

‘attached to the soil’

ep-ouranios < *epi ouran(os)*

on sky, heaven

‘heavenly’

meta-de:mios < *meta de:m(os)*

among people

‘among the people’

hup-ouranios < *hupo ouran(os)*

under sky, heaven

‘under heaven, under the sky’

Such compounds are related with syntactic phrases in which the preposition governs the noun as in *ein-alios* which corresponds to the phrase *en ali* (in sea.DAT) ‘(who is) in the sea’. Similarly, *agchi-theos* is related with the syntagm *agchi theo:n* (near god.PL.GEN) ‘(who is) near the gods’.

Two points are of major relevance to the current discussion. First, these compounds

¹¹For a detailed analysis of prepositional compounds see Chapter 8.

show that variation with respect to the head-dependent order may exist in the same language. For example, it is not the case that these compounds follow the dependent-head order of other Greek compounds; they are not head-final. Second, this variation can be explained if a relation between morphology and syntax is established. That is, they exhibit the order Prep. + Noun because there is a relation between these formations and syntactic phrases. Under a purely morphological account, however, these compounds should have been right-headed, i.e. Noun + Prep.(to be more precise Noun + Post.).

6.4.3 Adjectival compounds

Head-first adjectival compounds also indicate that variation in the position of head may exist in the same language. Consider the following examples:

(41) *is-o-the-os* < *is(os)* *the(os)*

equal_to-LE-god-Infl equal_to god

‘equal to the Gods’

is-athanat-os < *is(os)* *athanat(os)*

equal_to-immortal-Infl equal_to immortal

‘equal to the Immortals’

eikel-oneir-os < *eikel(os)* *oneir(o)*

like-dream-Infl like dream

‘dream-like’

a-peir-o-gam-os < *a-peir(os)* *gam(os)*

inexperienced_of-LE-wedding-Infl without_experience_of wedding

‘unwedded’

ken-andr-os < *ken(os)* *an(e:r)*

empty_of-man-Infl empty_of man

‘empty of men’

ere:m-o-kom-e:s < *ere:m(os)* *kom(e:)*

void_of-LE-hair-Infl void_of hair

‘void of hair’

axi-o-log-os < *axi(os)* *log(os)*
 worthy_of-LE-speech-Infl worthy_of speech
 ‘worthy of mention, remarkable’

As we see from the examples in (41), these formations are composed of an adjective which has governing properties and a noun which serves as a complement to the adjective.

In order to address the question of the position of head in these formations, one could propose that they exhibit the same head-dependent order as the following syntactic phrases:

- (42) *isos theoisin* *Sapph.2.1*
 ‘equal_to god.PL.DAT’
- eikelos auge:* *Il. 22.134*
 ‘like gleam.SG.DAT’
- apeiros athlo:n* *Thgn.1013*
 ‘inexperienced_of deed.PL.GEN’
- kenon dentro:n* *Pl.R.621a*
 ‘empty_of tree.PL.GEN’
- ere:mon andro:n* *Hdt.6.23*
 ‘void_of man.PL.GEN’
- axios time:s* *E.Hec.309*
 ‘worthy_of honour.SG.GEN’

In the phrases in (42), the adjective serves as the head of the construction and as a governor determines the shape of the element which appears as its sister. For example, in the phrase *kenon dentro:n* (empty_of tree.PL.GEN), the adjective *kenos* acts as a head and its complement appears in genitive.

Observe that both the compounds in (41) and the syntactic phrases in (42) exhibit a head-dependent order, in that adjectives such as *isos* and *kenos* which act as heads appear on the lefthand side and the noun which is the non-head, follows the adjective.

For example, in both the compound *iso-theos* and the phrase *isos theoisin* (equal_to god.PL.DAT) from Sappho, the noun *theos* follows the adjective. It should also be mentioned that the phrase *axios time:s* (worthy_of honour.SG.GEN) appears in the form of a compound, i.e. *axi-o-tim-os* (worthy_of-LE-honour-Infl), in later authors.

To summarize, a purely morphological account fails to (a) predict variation in the head-dependent order in compounds and (b) explain the left-headedness of these compounds. If the ordering of morphemes was set once and for all for all compounds, this is at least the claim of much morphological research, these compounds should have arisen as right- and not left-headed.

6.5 A pinhole in the Morphology-Syntax firewall

Having shown that there is data which argues in favour of a morphology-syntax interaction with respect to the head-dependent order inside compounds, let us now return to the issue of left-headed [N N] compounds. In the previous chapter, I argued that there are [N N] compounds which exhibit left-headedness despite that Greek compounds generally obey the RHR. In my analysis, I proposed that the phenomenon of left-headedness should not be considered a matter of language interference, but that independent system-internal reasons may have given rise to left-headed formations. In this section, I examine whether this system-internal factor could be the relation between morphology and syntax.

The prepositional and adjectival compounds presented in the previous sections indicate the relation between compounds and phrases in that new compounding patterns may be created via desyntactization. In addition, these patterns are expected to exhibit the same linear order as their source. There is, however, an important difference between these compounds and the left-headed [N N] ones. The latter are not expected to arise simply because there is a very well established and productive right-headed [N N] compounding pattern in Greek.

In more detail, the left-headedness of prepositional and adjectival compounds can be accounted for as follows: these compounds are new compounding patterns and exhibit the order evident in the phrases from which they originate. [N N] compounding, however, is not a new compounding pattern. A very productive right-headed [N N]

compound pattern existed prior to the creation of left-headed [N N] compounds.

The foregoing discussion raises the following questions:

- (a) Why is there variation in the same compounding system?
- (b) Why did left-headed [N N] compounds arise, since there had already been a right-headed pattern for [N N] compounds?
- (c) What does this variation mean for the morphological component and its relation to syntax?

The rest of this section answers these questions in detail.

6.5.1 Reordering and variation in morphology

The phenomenon of left-headedness in [N N] compounding shows that variation in the head-nonhead order exists in the same language; initially, there is an AB order, where B is the head and A is the non-head, and at some point (Ancient Greek), a BA order arises. This new order does not, nevertheless, substitute the older AB order.

In what follows, I first comment on system-internal factors which constrained the application of the new BA order and which highlight the exceptionality of this phenomenon. Second, I raise the question whether there are similar phenomena in other morphological processes, i.e. inflection and derivation.

To begin with, it is at least implicit in much morphological work that the order of morphemes inside words is fixed. This assertion partly stems from the fact that “change in the order of morphemes inside a word is [...] quite exceptional” (Comrie, 1980: 85). On the fixed order of morphemes, consider the formulation of the *Lexical Integrity Hypothesis* by Bresnan and Mchombo (1995) which I repeat in (43):

- (43) A fundamental generalization that morphologists have traditionally maintained is the *lexical integrity principle*, which states that words are built out of different structural elements and by different principles of composition than syntactic phrases. Specifically, the morphological constituents of words are lexical and sublexical categories - stems and affixes - while the syntactic constituents of phrases have words as the minimal, unanalyzable units; and syntactic ordering principles do not apply to morphemic structures. As a result, morphemic order is

fixed, even when syntactic word order is free; the directionality of ‘headedness’ of sublexical structures may differ from supralexical structures; and the internal structure of words is opaque to certain syntactic processes.

(Bresnan and Mchombo, 1995: 181-182)

In their formulation of Lexical Integrity, Bresnan and Mchombo deny any interaction between morphology and syntax in that these two components make use of different primitives and principles. Of importance to our study of the head-nonhead order are the following three assertions:

- (a) Morphemic order is fixed.
- (b) The order of morphemes is fixed even when the order of words in syntax is free.
- (c) The position of head in words may be different from the position of head in phrases.

This concept of morpheme ordering makes no provision for change or variation in the head-nonhead linearization inside words; the order of morphemes is fixed and, as a result, no change or variation is expected to arise. In addition, based on Lexical Integrity, variation in the position of head in syntax is never reflected in morphology since there is no interaction between the two components; morpheme ordering is governed by morphological principles only. In my opinion, although Bresnan and Mchombo (1995) are right to assume that the head-nonhead order inside words may be different from the position of head in syntactic phrases—it is certainly true that in several languages the order of constituents in compounds is different from the order of the same constituents in contemporaneous phrases—their assertions that morphemic order is fixed and that it is fixed even when syntactic word order is free, must be revised.

Another factor which severely constrains variation in the position of head is the asymmetry of morphology. According to Di Sciullo (2005), a basic characteristic property of morphology is that it combines and manipulates *asymmetric relations* only. This simply means that, in morphology, the inversion of two elements in a structured set gives rise to morphological gibberish (#) or to a different meaning. Consider derivation (*ibid.*, 13-14):

- (44) a. writ-er / #er-write
 b. re-writ-ing / #ing-write-re
 c. en-trap-ment / #ment-trap-en
- (45) a. compute, comput-able, comput-er, comput-er-ize, comput-er-izable / # comput-ize-er, #comput-er-able, #comput-able-ize
 b. re-en-trap / #en-re-trap, re-en-capsul-ate / #en-re-capsul-ate
 re-dis-connect / #dis-re-connect

The examples in (44) show that affixes and roots cannot be inverted. The word *writer*, for example, cannot appear as *#er-write*. In a similar vein, a prefix such as *re-* can never appear after its base. The examples in (45) also indicate the ungrammaticality of configurations in which there is inversion among affixes. The configuration *#en-re-trap*, for instance, is ungrammatical, contrary to the word *re-en-trap*.

As illustrated in (46), this asymmetry holds for compounds as well:

- (46) a. paper cutter / #cutter-paper
 b. teacup / #cup-tea
 c. Sunday driver / #driver-Sunday
 d. elephant man / #man-elephant

Observe that change in the order of constituents in compound structures gives rise to a different interpretation. A *cup tea*, for example, does not have the same meaning as *tea cup*. It is always the case that the position of head in compounds is fixed; in English (and Greek) it is on the right.

In addition, various left-headed compounds of Italiot are attested as right-headed in Modern Greek without any change in meaning. The following pairs of an Italiot and a SMG compound only differ with respect to the head-nonhead linearization. No change in meaning is attested:

- (47) a. *fid̥d-ambel-o ampel-o-fill-o* < *fill(o) ampel(i)*
 leaf-vine-Infl vine-LE-leaf-Infl leaf vine
 ‘vine leaf’
- b. *klon-o-spart-o spart-o-klon-o* < *klon(os) spart(o)*
 twig-LE-sedge-Infl sedge-LE-twig-Infl twig sedge
 ‘twig of sedge’
- c. *spor-o-marath-o marath-o-spor-os* < *spor(os) marath(o)*
 seed-LE-fennel-Infl fennel-LE-seed-Infl seed fennel
 ‘fennel seed’

Consider also the following minimal pairs of left- and right-headed compounds from other Modern Greek dialects (for more data see Andriotis, 1939: 115-116):

- (48) a. *dafn-o-kukk-a kukk-o-dafn-a* < *kukk(i) dafn(i)*
 laurel-LE-seed-Infl seed-LE-laurel-Infl seed laurel
 ‘laurel seed’
- b. *kefal-o-mall-a mall-o-kefal-a* < *mall(ia) kefal(i)*
 head-LE-hair-Infl hair-LE-head-Infl hair head
 ‘head hair’
- c. *parathir-o-fill-o fill-o-parethir-o* < *parathir(o) fill(o)*
 window-LE-leaf-Infl leaf-LE-window-Infl window leaf
 ‘casement’
- d. *ker-o-psalid-o psalid-o-ker-i* < *ker(i) psalid(i)*
 candle-LE-scissors-Infl scissors-LE-candle-Infl candle scissors
 ‘scissors used for cutting candles’
- e. *lampr-o-skol-a skol-o-lampr-a* < *lampr(i) skol(i)*
 Easter-LE-holidays-Infl holidays-LE-Easter-Infl Easter holidays
 ‘Easter holidays’
- f. *mat-o-frid-o frid-o-mat-o* < *mat(i) frid(i)*
 eye-LE-eyebrow-Infl eyebrow-LE-eye-Infl eye eyebrow
 ‘eyebrow’
- g. *mel-o-pit-a pit-o-mel-i* < *mel(i) pit(a)*
 honey-LE-pie-Infl pie-LE-honey-Infl honey pie
 ‘pie with honey’

- h. *pod-o-stragal-os* *stragal-o-pod-o* < *pod(i)* (*a*)*stragal(os)*
 foot-LE-ankle-Infl ankle-LE-foot-Infl foot ankle
 ‘ankle’

Observe that in these minimal pairs, the first compound is right-headed, whereas the second formation is head-initial. By way of example, in *keropsárido*, the head, *psalídi*, appears on the right, whereas in *psalídokéri*, it appears on the left-most edge.

6.5.1.1 Reordering and variation in derivation and inflection

The exceptionality of the phenomenon of reordering and variation in compounding is highlighted by the fact that it has no parallel in derivation and inflection. As far as derivation is concerned (to the best of my knowledge) there are no examples in literature which illustrate that a derivational affix may change position with respect to its base or that, at the same time, a derivational affix may appear as a prefix and as a suffix. For example, I know of no suffix which has become a prefix; *writ-er*, **er-write*. Similarly, there are no prefixes which follow their base; *en-noble*, **noble-en*. To anticipate later discussion, this behaviour of derivational affixes supports the asymmetry of morphology and the idea that morpheme order is fixed.

Let us now turn to the examination of inflection since there is a case whereby an inflectional affix externalizes. Consider for example the Georgian indefinite pronoun *rame* ‘anything’ which is derived from the interrogative *ra* ‘what’ by the indefiniteness marker *-me*. Its inflectional patterns are given in (49) (from Haspelmath, 1993: 280):

(49)	<i>a. older</i>	<i>b. intermediate</i>	<i>c. newer</i>
	<i>pattern</i>	<i>pattern</i>	<i>pattern</i>
nom.	ra-me		ra-me
dat.	ra-s-me	ra-s-me-s	ra-me-s
adv.	ra-d-me	ra-d-me-d	ra-me-d
gen.	r-is-me		ra-me-s
instr.	r-iti-me		ra-me-ti

Observe that in (49a), inflection appears between *ra* and *-me*, in (49b), it appears both before and after *-me*, and, finally, in (49c), it appears external to *-me*. Haspelmath argues that this is an instantiation of the phenomenon of the *externalization of inflection*

whereby, when an inflectional suffix is trapped in an internal position, it is externalized. In this particular example, inflectional material was trapped between *ra* and *-me* and was therefore externalized; (49b) represents hybrid formations and is a transitional stage.

The externalization of inflection is a purely morphological phenomenon and can be explained by the following principle (from Haspelmath, 1993: 291):

(50) *The inflection-outside-derivation principle:*

A morphologically complex word is preferred if its inflectional affixes are further away from the root than its derivational affixes.

This means that this phenomenon has a morphological motivation; the change with respect to the position of inflection from internal to external is triggered by a morphological principle. In addition, this phenomenon militates against the assertion that morpheme order is fixed.

The change we observe in inflection and the variation in the position of head in compounds differ in a crucial respect. The phenomenon of externalization of inflection occurs only in those cases in which inflectional material is trapped in an internal position. It is not the case that an inflectional suffix will change into a prefix if it is not trapped between two non-inflectional morphemes. To put it bluntly, in the order AB (where A is a base and B is an inflectional suffix), the position of B and A is not expected to change. For example, the plural suffix *-s* is not expected to appear before its base; *cat-s*, **s-cat*. Left-headed compounds, however, show exactly that; an AB to BA order.

6.5.2 Variation in phrases and compounds

In the previous section, I argued that although certain factors, such as the asymmetry of morphology, severely constrain variation inside words, the order of morphemes may very well not be fixed. In what follows, I will try to identify the motivation for the variation evident in compounds such as *sporomárho/marathósporos* ‘seed of fennel’ and to test the validity of the proposal that the order of morphemes is fixed even when the order of words in syntax is free.

First let us comment on whether this variation should be attributed to morphological principles. To the best of my knowledge, there is no morphological principle which could explain the left-headedness of a compound such as *sporomárho* ‘seed of fennel’.

On the contrary, it follows from the fixed order of elements inside morphological objects that no order other than the established one should arise.

A second possible motivation for this variation is syntactic word order. As argued for in this chapter, there is plenty of evidence that syntactic word order may interact with constituent order inside compounds; consider for example left-headedness in compound patterns such as verb-first compounds. In order to examine this possibility we should establish a relation between left-headedness in compounds and head-initial phrases.

To begin with, compounds such as *sporomárho* ‘seed of fennel’ correspond to [N N_{GEN}]_{NP} phrases. This particular compound corresponds to the phrase *o spóros tu maráthu* ‘DET. seed.NOM DET. fennel.GEN’. In a similar vein, the compound *fiððám-belo* ‘vine leaf’ corresponds to the phrase *to fiððo t’ ambeliu* ‘DET. leaf.NOM DET. vine.GEN’¹².

Second, we know that left-headed [N N] compounding arose in Ancient Greek. Therefore, if one would like to link the variation evident in compounds to syntax, one must provide evidence that there was variation in the order of [N N_{GEN}]_{NP} phrases. This kind of evidence comes from the work of Manolessou (2000). According to Manolessou (2000: 74) adnominal genitives in Classical Greek may appear as follows:

- (a) Post-nominal (after the modified noun): *ho thronos tou basileo:s*
- (b) Initial (before the modified noun and its article): *tou basileo:s ho thronos*
- (c) Internal (between the modified noun and its article): *ho tou basileo:s thronos*
- (d) Repeated article (after the modified noun, with repeated article): *ho thronos ho tou basileo:s*

All of the above phrases have the meaning ‘the throne of the king’; *ho thronos tou basileo:s* ‘DET.NOM throne.NOM DET.GEN king.GEN’. Although it is not the purpose of the present thesis to provide an analysis of the evolution of Noun-phrase in Greek (on this see Manolessou, 2000), of importance to our study is that variation manifests itself in adnominal genitives in Classical Greek.

It is the contention of the present study that the motivation for the formation of left-headed [N N] compounds is the variation evident in phrases consisting of a noun

¹²Karanastasis (1992) offers the following sentence from Southern Italy: *Ta fiððám-bela en’ da fiðða t’ ambeliu* ‘the vine-leaves are the leaves of the vine’.

modified by a noun in genitive. Interestingly, research has shown that the same type of phrase, i.e. $[N N_{\text{GEN}}]_{\text{NP}}$ or $[N_{\text{GEN}} N]_{\text{NP}}$, has given rise to compounds in a number of languages (consider for example the rise of nominal compounding in Germanic and the data presented in (7)). Consider also the presence of verb-first compounds. As argued for in Section 6.4.1, verb-first compounds indicate that variation in syntactic word order may be the trigger for compounds which do not follow the morphological settings for the dependent-head linearization.

6.5.3 Variation and the Lexical Integrity Hypothesis

In the previous sections, I argued that any change in the head-dependent order inside words is severely constrained by system-internal factors. This makes any change in morpheme order quite exceptional and one must identify the motivation(s) for such a change. Formations such as **noble-en* instead of *en-noble* and **s-cat* instead of *cat-s* would certainly sound exceptional and to the best of my knowledge no suffix has changed into a prefix and no prefix has changed into a suffix.

Compounds which do not follow the morphological settings for the position of head, and most importantly, minimal pairs of left- and right-headed compounds, however, do exist. This raises a number of questions with respect to the demarcation between morphological processes and the possible developmental paths for the ordering of morphemes inside words. To put it bluntly, the phenomenon of left-headed compounds arose in Ancient Greek and manifests itself in all evolutionary stages of Greek and its dialects (with the exception of Standard Modern Greek). Although this phenomenon did not substitute the creation of right-headed formations, one must be able to explain (a) why we only find this phenomenon in compounds and not in derived or inflected words and (b) why this is a possible developmental path for morpheme-ordering inside compounds.

Based on Haspelmath (1993), the phenomenon of the *externalization of inflection* has a purely morphological explanation since inflectional affixes which are trapped between non-inflectional material tend to externalize. Left-headedness in Greek compounding, however, cannot be explained on morphological grounds. Frankly, morphological accounts do not even make provision for change in the head-dependent order inside words. In addition, based on the asymmetry of morphology, a change in the or-

der of elements inside compounds would give rise to a different meaning. The existence of pairs such as *kukkódafna-dafnókukka* ‘laurel seeds’, argues against this principle. Finally, although Bresnan and Mchombo (1995) are right to assume that “the directionality of ‘headedness’ of sublexical structures may differ from supralexicale structures”, their assertion that “morphemic order is fixed, even when syntactic word order is free” must be revised.

In what follows, I attempt to generalize over these observations. The foregoing discussion suggests the following four hypotheses for the linearization of compound constituents α and β , where α is the head and β the non-head:

(51) Hypothesis 1:

The linearization of compound constituents is free.

Compound order: $\alpha\beta$ or $\beta\alpha$.

In this scenario we expect free order in compounds without constraints.

(52) Hypothesis 2:

The linearization of compound constituents only obeys morphological principles.

Two possibilities:

a. morphological rule: $\alpha\beta \rightarrow$ compound order: $\alpha\beta$

b. morphological rule: $\beta\alpha \rightarrow$ compound order: $\beta\alpha$

The way I have formulated Hypothesis 2 seems to suggest that morphological rules of linearization inside compounds are arbitrary, but this is at least implicit in much morphological research. The Right-hand Head Rule, for example, dictates in an arbitrary way that the head is on the right. In a similar vein, much morphological research argues in favour of the idea that the position of head inside compounds should be stipulated. Hypothesis 2 argues in favour of: (a) the autonomy of morphology as a module, (b) the Lexical Integrity Hypothesis, and (c) the morphological make-up of compounding as a process. In addition, given that it is assumed that morpheme order is fixed, no provision is made for variation or change in the linearization of elements inside compounds. This hypothesis, on which the RHR is based, also suggests that no syntactic order is to be reflected in compounds. Languages with left-headed compounds follow setting

(a) and languages with right-headed compounds obey setting (b). Formations, such as left-headed compounds in Greek, which do not follow the established morphological setting for the position of head clearly militate against this hypothesis.

Let us consider Hypothesis 3:

(53) Hypothesis 3:

The linearization of compound constituents obeys syntactic principles. Two possibilities:

- a. syntactic rule: $\alpha\beta \rightarrow$ compound order: $\alpha\beta$
- b. syntactic rule: $\beta\alpha \rightarrow$ compound order: $\beta\alpha$

This hypothesis argues in favour of a syntactic account of the head-nonhead linearization in compounds and, consequently, against the autonomy of morphology and the Lexical Integrity Hypothesis (consider for example the framework developed by Lieber, 1992).

The basic advantage of this hypothesis is that it allows for change in the order of morphemes and, in addition, it allows for variation in compounds, provided that there is variation in phrases. On the latter issue, I would like to add the observation that there are languages which exhibit different order in compounds composed of two nouns and compounds composed of an adjective and a noun. DeLancey (1994), for instance, reports that Tibetan has head-final [N N] compounds but left-headed [N A]_N ones. Crucially, these different orderings are attributed to syntax since these compounds exhibit the head-dependent order of their corresponding phrases. That is, [N N] modification is head-final, whereas [N A] modification is head-initial.

Consider also compounding in Guaraní (from Wälchli, 2005: 246):

(54) a. *tesa.y* ‘eye-water (‘water of the eye’)>tear’

b. *kuân.guasú* ‘finger-big>thumb’

The compound in (54a) is composed of two nouns and is right-headed, whereas the [N A]_N compound in (54b) is left-headed. This variation in the position of head in the same language can only be explained by syntax since these compounds exhibit the linear order of the following phrases:

- (55) a. *kuã r.oga* ‘woman house>house of the woman’
 b. *oga guasu* ‘house big>the/a big house’

In (55a) we have head-final noun noun modification and in (55b) we observe that the non-head, i.e. the adjective, follows the head, i.e. the noun. These two different head-dependent orders are also mirrored in the compounds of Guaraní.

The main disadvantage of Hypothesis 3 is that it is not always the case that a change in syntax will necessarily be reflected in the compounding system of a language. In addition, there are several languages in which the order of elements inside compounds differs from the order of the same elements in contemporaneous phrases.

Let us now consider Hypothesis 4:

(56) Hypothesis 4:

The linearization of compound constituents could in principle obey morphological and syntactic principles. Four possibilities:

- a. morphological rule: $\alpha\beta$ and syntactic rule: $\beta\alpha \rightarrow$ compound order: $\alpha\beta$ or $\beta\alpha$
- b. morphological rule: $\beta\alpha$ and syntactic rule: $\alpha\beta \rightarrow$ compound order: $\beta\alpha$ or $\alpha\beta$
- c. morphological rule: $\alpha\beta$ and syntactic rule: $\alpha\beta \rightarrow$ compound order: $\alpha\beta$
- d. morphological rule: $\beta\alpha$ and syntactic rule: $\beta\alpha \rightarrow$ compound order: $\beta\alpha$

In my opinion, Hypothesis 4 is the only hypothesis which is empirically motivated and supported by data. It should be stressed, however, that Hypothesis 4 is meant to capture not only those cases in which linearization inside compounds follows the established morphological settings, but also cases in which linearization differs from these settings. Contrary to Hypothesis 2, on which much morphological work is based, this hypothesis argues in favour of a morphology-syntax interaction with respect to the linearization of morphemes inside compounds, in that morphological rules of compounding can be emergent from syntactic rules. It should be stressed that it is likely that Hypothesis 2 holds true for derived and inflected words, but it cannot take into account variation in compounding.

Hypothesis 4 allows for and predicts the presence of variation. For example, parts (a) and (b) of Hypothesis 4 dictate that if morphological and syntactic settings for the

position of head are contradictory, there might be variation in the position of head inside compounds. The presence of verb-first and left-headed [N N] compounds fleshes out this prediction. [N N] compounds which obey the morphological settings for the position of head are right-headed, whereas, left-headed [N N] compounds follow the syntactic head-first setting.

Hypothesis 4 also allows for and predicts the creation of new compound patterns which do not follow the morphological settings for the position of head. Prepositional and adjectival head-first compounds (Section 6.4) serve as examples which verify this Hypothesis. Under Hypothesis 2, a left-headed compound such as *axi-o-tim-os* ‘worthy-LE-honour-Infl, worthy of honour’, should be right-headed, i.e. **tim-o-axi-os* ‘honour-LE-worthy-Infl’ and not left-headed. Contrary to Hypothesis 2, Hypothesis 4 predicts that new compounding patterns may follow non-morphological settings for the linearization of constituents.

It should be stressed that Hypothesis 4 can also take into consideration diachronic change since a change in syntactic word order may be reflected in compounds. As we saw, diachronic change is one of the disadvantages of Hypotheses 2 and 3. The former makes no provision for such a change, whereas in the latter we do not expect to find contemporaneous compounds and phrases with different head-dependent linearization settings. On this issue, it should be mentioned that Hypothesis 4 makes another prediction; no change in the linearization of compound members is expected to arise without previous change in phrases (see also Gaeta, 2008). This means that the motivation for change in the head-dependent order inside compounds is syntax. This renders compounding different from both derivation and inflection since any change in the base-affix linearization in these processes has morphological motivation (see the discussion on the *externalization of inflection* in Section 6.5.1). It seems, however, that change or variation in syntax is the factor which triggers change in compounding.

It should also be noted that parts (c) and (d) of Hypothesis 4 make another prediction with respect to the position of head inside compounds. It follows from Hypothesis 4 that if the settings for the position of head are the same in both morphology and syntax, no variation in the linearization of elements is expected. This is a type of interaction through *blocking*. Therefore, in a language with $\alpha\beta$ setting for both morphology and syntax, no $\beta\alpha$ order in compounds is expected. In a similar vein, a language with $\beta\alpha$

setting for both morphology and syntax, is not expected to exhibit $\alpha\beta$ compounds.

A comparison between Greek [N N] and [A N] compounds fleshes out this prediction. A study of Greek compounds from Homer to SMG shows that although there are left-headed compounds of the [N N] pattern, no real attributive [N A]_N pattern is attested. As presented in Chapter 5, even Bovesse-Greek, which retains a number of left-headed [N N] compounds, does not exhibit a [N A]_N pattern. The absence of a [N A]_N pattern from Greek should be attributed to the fact that the modification of a noun by an adjective in Greek syntax follows the order Adj. + Noun (Alexiadou, 2003: 8; Stavrou, 1996: 108). The following examples from Alexiadou (2003) indicate that a noun always follows the adjective which modifies it:¹³

(57) a. **to spiti meghalo/paljo/oreo*
the house big/old/nice

b. *to meghalo/paljo/oreo spiti*
the big/old/nice house

A study of the evolution of the Greek compounding system shows that the only adjective which in some cases follows a noun in compounds, is the adjective *ágrios* ‘wild’. By way of example, *aig-agros* and *su-agros* in (58) show the order [N A]:

(58) *aig-agr-os* < *aix agrios* *Babr.102.8, Opp.C.1.71*
goat-wild-Infl goat wild
‘the wild goat’

su-agr-os < *sus agrios* *Antiph.42, Dionys.Trag.1.2*
boar-wild-Infl boar/sow wild
‘wild boar or sow’

Although these examples seem to contradict Hypothesis 4, there is evidence from grammarians that these particular compounds were formed based on syntactic head-initial phrases:

(59) *Suagros ou rhe:teon· Sun agrion hoi archaioi legousin.*
‘Boar-wild is not said· boar wild the ancestors say.’

¹³As Stavrou (1996: 81) notes, the order [N A] is a marked one and gives rise to a predicative and not to an attributive meaning.

This extract from Phrynichus (Fischer, 1974) shows that there is a relation between the compound *su-agros* ‘boar-wild’ and the syntactic phrase *Sus agrios* ‘boar.NOM wild.NOM’. If anything, these formations corroborate the idea that there is a relation between compounds and phrases.¹⁴

To summarize, the absence of a real [N A]_N pattern in Greek can be explained as follows: As predicted by part (d) of Hypothesis 4, given that both the morphological and syntactic settings for the position of head in constructions in which an adjective modifies a noun are *head on the right*, no [N A] is expected to arise; the linearization in attributive compounds composed of an adjective and a noun is predicted to be the one in which the adjective precedes the noun. On the contrary, left-headed [N N] compounds exist because this particular order is licensed by syntactic word order. As predicted by part (b) of Hypothesis 4, contradictory morphological and syntactic settings with respect to the position of head may be reflected in compounds. The interaction between morphology and syntax with respect to linearization inside compounds, however, is heavily constrained by a number of factors including the fixed order of morphemes inside words and the strict asymmetry of morphology.

6.6 Other non-morphological linearization settings

A question which arises is whether there are other non-morphological settings with respect to constituent order inside compounds. Interestingly enough, much morphological research denies that morphology and syntax interact, but it does not consider the possibility that other grammatical components could affect the linearization inside compounds. In what follows, I comment on constituent order in Greek co-ordinate compounds since linearization inside these formations may be affected by other non-morphological settings.

To begin with, *temporal iconicity*, that is, the temporal sequence of events, is considered important with respect to the order of constituents in [V V] Greek compounds (Kiparsky, 2009; Ralli, 2013). Consider the following examples:

¹⁴For completeness I would like to mention that left-headed compounds were condemned by grammarians such as Phrynichus.

- (60) *anig-o-klin-o* < *anig(o) klin(o)*
 open-LE-close-Infl open close
 ‘open and close’
- mpen-o-vgen-o* < *mpen(o) vgen(o)*
 go_in-LE-go_out-Infl go in go out
 ‘go in and out’

Observe that the order of constituents in these compounds reflects the sequence of events described by the compound. As a result, *anigoklino* is not attested as *klinanigo* because one first opens something, e.g. the door, and then one closes it. In a similar vein, *mpenovgeno* exhibits this particular order because one first goes in and then one goes out of something, e.g. a house. Ralli (2013: 170) provides two counterexamples to this semantic constraint:

- (61) *alon-o-ther-iz-o* < *alon(izo) theriz(o)*
 thresh-LE-reap-Dsuf-Infl thresh reap
 ‘thresh and reap’
- pantev-aravon-iaz-o* < *pantev(o) aravoniaz(o)*
 marry-engage-Dsuf-Infl marry engage
 ‘marry and engage’

The order of constituents inside these compounds does not follow iconicity. Iconicity, for example, predicts the order *theralonizo* instead of *alonotherizo* since one first reaps and then threshes. The bulk of verbal co-ordinate compounds, nevertheless, conforms to *temporal iconicity*.

According to Ralli (2013), the order of constituents inside Greek [N N]_N co-ordinate compounds is fixed and is governed by semantico-pragmatic settings (on this also see Anastasiadi-Symeonidi, 1996). For example, the compound *alatoipero* in (62), exhibits this particular order because the first constituent, i.e. *alati*, is in some way considered more important than the constituent *pipéri*. Similarly, *ginekópeda* never appears as *pedogíneka* because the meaning of the first constituent somehow prevails over the meaning of the second constituent:

(62) *alat-o-piper-o* < *alat(i) piper(i)*

‘salt-LE-pepper-Infl’ salt pepper
‘salt and pepper’

ginek-o-ped-a < *ginek(a) ped(i)*

woman-LE-child-PL woman child
‘women and children’

Counterexamples, however, do exist. Consider the following from Andriotis (1939: 113):

(63) *April-o-ma-is* *Magi-april-o* < *April(is) Mai(os)*

April-LE-May-Infl May-LE-April-Infl April May
‘April and May’

lad-o-ksid-o *ksid-o-lad-o* < *lad(i) ksid(i)*

oil-LE-vinegar-Infl vinegar-LE-oil-Infl oil vinegar
‘oil and vinegar’

riz-o-gal-o *gal-o-riz-o* < *riz(i) gal(a)*

rice-LE-milk-Infl milk-LE-rice-Infl rice milk
‘rice and milk’

skot-o-plemon-a *plemon-o-skot-a* < *s(i)kot(i) pne(v)mon(as)*

liver-LE-lung-Infl lung-LE-liver-Infl liver lung
‘liver and lungs’

It should be noted that this is an important difference between co-ordinate, on the one hand, and subordinate and attributive compounds on the other hand. In subordinate and attributive compounds no semantico-pragmatic setting affects the linearization of constituents. If attributive and subordinate compounds obeyed this rule, then all Greek compounds would be left-headed. For instance, the compound *agriánthropos* ‘wild/savage man’ composed of the adjective *agri(os)* ‘wild’ and the noun *anthrop(os)* ‘man’ should appear with the opposite order of constituents, that is, **anthropoágrios*, since the element which is considered more basic on a semantic level is the noun *ánthropos* and not the adjective *ágrios*.

That the order of elements inside co-ordinate compounds may not always be fixed is corroborated by the presence of minimal pairs of [A A] compounds. Consider the

following from Ralli (2013: 168):

- (64) *kitrin-o-prasin-os* *prasin-o-kitrin-os* < *kitrin(os) prasin(os)*
 yellow-LE-green-Infl green-LE-yellow-Infl yellow green
 ‘yellow and green’
- ksin-o-glik-os* *glik-o-ksin-os* < *ksin(os) glik(os)*
 sour-LE-sweet-Infl sweet-LE-sour-Infl sour sweet
 ‘sour and sweet’
- makr-o-sten-os* *sten-o-makr-os* < *makr(is) sten(os)*
 long-LE-narrow-Infl narrow-LE-long-Infl long narrow
 ‘narrow and long’

The largely free order of elements attested in [A A] co-ordinated compounds could possibly be explained by the fact that in these compounds none of the constituents is considered more salient than the other. For example, the compound *glikóksinos* could be used with the form *ksinóglikos* to describe something, e.g. a sauce, without any change in meaning.

Although it is difficult to formalize constituent order in Greek co-ordinate compounds, of importance to our study is the fact that Hypothesis 2 in (52) is not verified by this type of compounds. Based on Hypothesis 2, the order of elements inside compounds is governed by morphological rules only and is always fixed. Co-ordinate compounds, however, violate this strict asymmetry of morphology in two ways: first, it seems that a semantico-pragmatic setting governs the linearization of constituents and, second, variation may also arise in this compounding type.

6.7 Conclusions

The purpose of this chapter was the identification of system-internal factors which govern the head-nonhead linearization inside compounds. In particular, historical, typological, and formal accounts argue in favour of a relation between morphology and syntax. Compounds, for example, may arise through *univerbation* of syntactic phrases and this syntactic origin of compounding may have implications for the ordering of morphemes inside compounds since compound words are expected to retain the order of their source.

In addition, it was argued that variation in the order of compound members may not only exist cross-linguistically, but also in the same language. More specifically, although Greek compounds generally obey the Right-hand Head Rule, in this chapter, I presented compound patterns from previous evolutionary stages of Greek which are left-headed. The analysis of these formations showed that this particular ordering should be attributed to the relation between morphology and syntax. It should also be mentioned that the absence of variation in the position of head in other morphological processes, i.e. inflection and derivation, highlights the exceptionality of this phenomenon in compounding. It also shows the difference between inflection, derivation, and compounding, since the latter is considered to be a syntax-like morphological process.

The proposed analysis has implications for the *Lexical Integrity Hypothesis* since it militates against a concept of grammatical organization in which syntax and morphology do not interact. In fact, in this chapter I argued that the interaction between these two components accounts not only for the variation we find in compounds, but also for the fact that certain head-dependent orders are not expected to arise. This interaction licenses certain morpheme orderings and blocks others. Under a purely morphological analysis, however, we can neither explain nor predict the presence or absence of certain orderings and variation. (Frankly, a purely morphological analysis does not even allow one to raise these questions and this is the main reason for which there is very little in the literature to date that deals with the issue of the head-nonhead order inside compounds.) Rules of compounding can be emergent from syntactic rules and morpheme order inside compounds is amenable to change. Crucially, a factor which may trigger a change in the head-nonhead linearization inside compounds is syntax.

To conclude, in this chapter, I focused primarily on one factor which may affect linearization inside compounds, namely, syntax. Future research may show that other factors may be relevant to the discussion of morpheme ordering inside compounds. For example, it seems that *temporal iconicity* governs the distribution of elements inside co-ordinate compounds.

Part IV

On the presence and absence of head

Endocentricity and exocentricity

The purpose of Part IV of the present thesis is to tackle the issue of presence and absence of head which cuts across the distinction between *endocentric* and *exocentric* compounds. Chapter 7 serves as an introduction to the notions of *endocentricity* and *exocentricity* and Chapter 8 deals with the way the relation between compounding and derivation manifests itself in exocentric compounds.

The present chapter is structured as follows: In Section 7.1, I present the classification of compounds proposed by Bloomfield (1933). In Section 7.2, I deal with the typology of exocentric compounds and their classification into *bahuvrihi*, *exocentric synthetic*, *exocentric co-compounds*, and *transpositional*. In Section 7.3, I present a recent proposal by Scalise et al. (2009) who argue that the notions *exocentricity* and *head* can be split into three types, and in Section 7.4, I focus on the way exocentricity can be captured in the framework of Lexical Semantics (Lieber, 2004, 2009).

In the remaining sections I critically evaluate the literature on exocentricity. In Section 7.5, I present some problems with the identification of exocentric compounds and argue against the idea that exocentricity should be split into various types. In Section 7.6, I focus on the analysis of *bahuvrihi* compounds. Based on the distinction between nominal and adjectival *bahuvrihis*, I argue that the former should be analyzed via metonymy

and that the latter can be better understood if we examine the relation between compounding and derivation.

7.1 Bloomfield's classification of compounds

Bloomfield (1933) classifies compounds based on two criteria: (a) the relation which holds between the compound members and (b) the relation of the compound as a whole to its members. With respect to the relation between the constituents, Bloomfield identifies compounds whose members have the same grammatical relation as words in a phrase (*syntactic compounds*) and compounds whose members do not exhibit a relation parallel in the syntax of the language in question (*asyntactic compounds*). By way of example, *whitecap* is syntactic since it shares the same construction, 'adjective plus noun', with the phrase *white cap*, whereas, *door-knob* is asyntactic, given that there is no parallel syntactic phrase as *door knob*.

In between the syntactic-asyntactic classification, Bloomfield identifies a number of compound types which are termed *semi-syntactic*. On the one hand, the constituents of a semi-syntactic compound exhibit a relationship parallel to syntax, but, on the other hand, the compound deviates from a syntactic phrase in a significant way. The semi-syntactic compound, *blue-eyed*, for example, exhibits the same 'adjective plus noun' construction with the corresponding phrase *blue eyes*, but it differs from it with respect to the presence of the suffix *-ed*.

As far as the relation of the compound as a whole to its members is concerned, Bloomfield uses the distinction between *endocentric* and *exocentric* compounds.¹ This distinction is based on both syntactic and semantic criteria. What differentiates the endocentric *blackbird* from the exocentric *turnkey* is the fact that the former has the same category (noun) as its head, *bird*, whereas, the latter is a noun, contrary to its head, i.e. the verb *turn*. Interestingly, Bloomfield considers compounds that exhibit a different gender value from that of their head, to be exocentric. As an example, Bloomfield gives

¹Although modern scholarship holds the view that the distinction between endocentric and exocentric compounds was introduced into linguistic theory by Bloomfield (Bauer, 2008b: 52; Bauer, 2006: 724), it seems safe to suggest that this is not accurate, since (a) this distinction may have Sanskrit origins and (b) several authors had already used the notion of exocentricity before Bloomfield. For more on this issue see Appendix B.

the French *le rouge-gorge* ‘robin’ (lit. red throat) that is masculine, despite the fact that its head, *la gorge* ‘the throat’, is feminine.

Bloomfield also suggests that there are compounds which are of the same category as their heads but which are to be considered exocentric based on semantics. The compound *red-head*, for example, is a noun like its head element but is exocentric based on semantic criteria. Such a compound is exocentric because the whole compound does not belong to the same species as its head. In other words, the whole compound is not a hyponym of its head; *red-head* does not denote a kind of head.

7.2 Classification of exocentric compounds

In compounding, *endocentricity* and *exocentricity* are traditionally related with the presence or absence of a lexical head. Given that (semantic) headedness can be shown by *hyponymy*, exocentric compounds cannot be interpreted as hyponyms of one of their constituents. On the contrary, an endocentric compound is a hyponym of its head, as defined by the ‘*IS A*’ condition (Allen, 1978), according to which *Z* denotes a subclass of its head element *Y*:

(1) In a compound [[]_X []_Y]_Z, *Z* ‘*IS A*’ *Y*

Consider the Greek compound *agrioguruno* ‘wild boar’, deriving from the stems of the words *agri(o)* ‘wild’ and *gurun(i)* ‘pig’. It must be endocentric, since it is a hyponym of *gurun(i)* (*agrioguruno* is a kind of *gurúni* ‘pig’, *agrioguruno* < *guruni*), i.e. its head element, and shares with it the category of the noun and the neuter gender value. This compound contrasts with a formation like *kokkinomallis* (< *kokkin(o)* ‘red’ + *mall(i)* ‘hair’), which does not denote a ‘kind of’ hair, but ‘a person with red hair’.

Generally, there is disagreement in the literature on what the types of exocentric compounds are. According to Bauer (2010: 167) who exploits exocentricity in a typological framework, an exocentric compound can fail the hyponymy test in three ways: (a) it may not display a head element, (b) it may belong to a lexical category which is not the category of its head, and (c) it may belong to the same category as its head, but its denotatum may be something different than its head element. Compounds which fail the hyponymy test are usually classified into the following types:

7.2.1 Bahuvrihi

The term *bahuvrihi*² which is often used as an umbrella term for exocentric compounds, has a Sanskrit origin and its meaning is ‘having much rice’. A bahuvrihi compound is usually composed of an adjective and a noun, and denotes someone or something which has a noun modified by the adjective. By way of example, the English *red head* is composed of the adjective *red* and the noun *head*, and denotes ‘someone who has red hair’. Given that these compounds have the meaning ‘who has X’, bahuvrihi formations can also be found in literature as *possessive* compounds. In the present thesis, the term *bahuvrihi* will be used to refer to compounds with the meaning ‘who has/to have X’ and not to denote exocentric compounds in general since, as I will show in this chapter, not all bahuvrihis are exocentric.

Examples of Adjective+Noun bahuvrihi compounds from a variety of languages are given in (2) (from Bauer, 2008b: 57)³:

(2) Adjective + Noun

hierohelma fine+hem ‘snobbish lady’ (Finnish)

nas tsoṭ nose+deformed ‘one with a deformed nose’ (Kashmiri)

nakeó-baskí ear+long ‘mule’ (Koasati)

Bahuvrihi compounds can also be composed of a Quantifier and a noun as in (3) (from Bauer, 2008b: 57):

(3) Quantifier + Noun

tusind-ben thousand+leg ‘millipede’ (Danish)

pənj-ab five+rivers ‘Punjab (a state with five rivers)’ (Hindi)

no-ndvat leg+four ‘car’ (Sye)

Another very commonly attested type of bahuvrihi consists of two nouns as in (4) (from Bauer, 2008b: 58):

²For more on the history of this term see Appendix B.

³For more data see Bauer, 2008b, 2010.

(4) Noun + Noun

kirr-maku face+woman ‘effeminate looking man’

(Kayardild, Evans, 1995: 197)

hirēvu neck+bulge ‘heron’

(Paamese, Bauer, 2008b: 58)

Given that in certain languages verbs perform functions of adjectives, Bauer (2008b) shows that bahuvrihi compounds may also consist of a verb and a noun (from Bauer, 2008b: 58):

(5) Verb + Noun

nyki kyl- tail+be long ‘duck’

(Nivkh)

Not all bahuvrihis are nouns, since several bahuvrihi compounds can also be used as adjectives. Of importance is that the head of these formations is not an adjective. Consider the following examples (from Bauer, 2008b: 60):

(6) *txori-buru* bird+head ‘bird-headed’

(Basque)

atsu-niku thick+flesh ‘fat-faced’

(Japanese)

Bauer also notes that bahuvrihi compounds may also serve as verbs, although this type is quite rare and the analysis of such compounds is not always easy (from Bauer, 2008b: 60):

(7) *isu mamafa* nose+heavy ‘have a cold’

(Samoan)

dii cay good+heart ‘be glad’

(Thai)

Observe that the Samoan *isu mamafa*, for example, is considered as bahuvrihi because it has the meaning ‘to have a heavy nose, to have a cold’.

7.2.2 Exocentric synthetic compounds

Synthetic compounds are usually composed of a deverbal element and a noun which serves as an argument of the verb. The compound *bus driver*, for example, is composed of the verb *drive*, the affix *-er* which corresponds to the external argument of the verb, and *bus* which functions as the internal argument of *drive*. Synthetic compounds which

are not based on this pattern are considered exocentric. Consider the following examples from Bauer (2008b: 62):

(8) *pick-pocket* pick+*pocket* ‘one who steals from pockets’

porta-cenere carry+ash ‘ashtray’ (Italian)

tsume-kiri nail+cut ‘nail-clipper’ (Japanese)

In order to understand why the compounds in (8) are considered exocentric, let us compare the endocentric *bus driver* to the exocentric *pick-pocket*. The two compounds do not differ with respect to their semantics, since they both denote ‘someone who performs the action denoted by the verb’; a *bus driver* is ‘someone who drives buses’ and a *pick-pocket* is ‘someone who picks pockets’. A comparison on a structural level, however, shows that *pick-pocket* is composed of a verb and a noun, whereas, *bus driver* consists of a deverbal element and a noun. That is, the suffix *-er* which functions as the external argument of the verb in *bus driver* is absent from the compound *pick-pocket*. In a similar vein, there is no affix corresponding to the external argument in the Italian *porta-cenere* and the Japanese *tsume-kiri*. Therefore, the compounds in (8) are considered exocentric because there is no overt marking of the external argument of the verb.

7.2.3 Exocentric co-compounds

Co-compounds are generally problematic with respect to the notion head and have been treated in different ways, depending on the author. Consider, for example, an appositional compound such as *signer-songwriter* which denotes ‘a person who is at the same time a singer and a songwriter’. Scholars such as Fabb (1998), Kageyama (2009), Bisetto and Scalise (2005: 234), and Scalise and Guevara (2006: 191) have proposed that such a compound has two heads (i.e. both lexemes are heads), and as such, is endocentric. In contrast, Haspelmath (2002: 89) has claimed that having two constituents as potential heads is like having none, and, therefore, co-compounds are to be considered exocentric.

Although there is no agreement on whether appositional co-compounds of the *singer-songwriter* type are exocentric, there are co-compounds which clearly fail the hyponymy test. Consider the examples in (9) from a variety of languages:

- (9) *mítná* eye+nose ‘organs’ (Meithei, Bauer 2008b: 63)
múú-nakk mouth+nose ‘face’ (Punjabi, Bauer 2008b: 63)
puwu-ca father+son ‘father son’ (Korean, Sohn 1994: 417)

A compound such as *mítná*, which is composed of *eye* and *nose*, fails the hyponymy test in that the whole compound is not a ‘kind of’ *eye* or *nose*; the meaning of the compound as a whole is ‘organs’. In a similar vein, *múú-nakk* denotes neither a *mouth* nor a *nose*, but *face*. The Korean *puwu-ca* also fails the hyponymy test because the whole compound is not a ‘kind of’ a *father* or a *son*.

7.2.4 Transpositional

In transpositional exocentric compounds, the lexical category of the whole compound is not overt. This makes them similar to exocentric synthetic compounds, the only difference being that in these formations there is no agentive reading. Consider the following examples:

- (10) *tua kuaga* to see + to live ‘visible’ (Damana, Bauer 2008b: 65)
ujauzito come + heavy ‘pregnancy’ (Swahili, Bauer 2008b: 65)
zhuǎn-yǎn turn + eye ‘instantly’ (Mandarin, Bauer 2010: 172)

This type of exocentric compounds may consist of subordinate and coordinate compounds. In the compound *tua kuaga*, for example, the two verbs are in a relation of coordination, whereas, the formation *zhuǎn-yǎn*, which is an adverb, consists of a verb and a noun which serves as the internal argument of the verb (subordination).

7.3 Splitting exocentricity

Following an approach based on features, and not on constituents as a whole, Scalise et al. (2009) have proposed that exocentricity can be better understood if it is split into *categorial*, *semantic*, and *morphological*, depending on the type of head of the construction, i.e. *categorial*, *semantic*, and *morphological*, as well as on the type of features one deals with. In other words, Scalise et al. (2009) challenge the idea that headedness depends on a single head, which imposes all of its properties to the whole compound,

since in their approach, a constituent can assume the role of the head, only with respect to some of its features.⁴ Therefore, for a compound to be classified as exocentric, there is no need to combine all three types of exocentricity.

Categorial, morphological, and semantic exocentricity are defined as follows:

(11) Categorial exocentricity

A compound is categorially exocentric if the constituent in the head position does not impose its categorial features on the whole construction.

(Scalise et al., 2009: 58)

Morphological exocentricity

A compound is morphologically exocentric if the morphological features of the compound are not identical to the morphological features of any of its internal constituents.

(Scalise et al., 2009: 59)

Semantic exocentricity

A compound is semantically exocentric if it denotes a class which cannot be derived from the classes denoted by its constituents.

(Scalise et al., 2009: 60)

Within this approach, a VN compound exhibits all three types of exocentricity. First, a compound such as *asciuga-capelli* ‘dry+hairs = hair dryer’ is categorially exocentric since the compound is not a verb as *asciuga* is, but a noun.

Second, VN compounds are morphologically exocentric. By way of example, the compound *limpia botas* ‘boot shiner’ in (12) which consists of the verb *limpia* and the noun *botas*, does not exhibit the morphological features of the noun *botas*; the whole compound is masculine singular, whereas *botas* is feminine plural:

- (12) el [limpia [botas]_{N.PL.F.}]
 the-SG.M. clean boots

Finally, VN compounds are also semantically exocentric since they belong to a semantic class which derives from none of the semantic classes denoted by its constituents: VN compounds express the external argument of the verb (usually an agent or an in-

⁴This proposal is similar to the *Relativised Head* proposed by Di Sciullo and Williams (1987) (see Section 2.2.5).

strument), despite the fact that this interpretation does not follow from the two basic constituents, a verb and a noun.

7.4 A Lexical Semantic approach to exocentricity

In what follows, I consider the lexical-semantic approach to exocentricity of Lieber (2009) since her treatment of the distinction between endocentric and exocentric compounds can inform our discussion. Lieber shares the view of scholars who argue that exocentricity is not a unified phenomenon (see for example the work of Scalise et al., 2009) and she classifies exocentric compounds into three types: *exocentric co-compounds*, *exocentric subordinate*, and *exocentric attributive*.

7.4.1 Exocentric co-compounds

As we saw in Chapter 4, an endocentric reading of co-compounds results from the very similar skeletal and bodily features of the compound members; only encyclopedic knowledge differs from one lexical item to the other. In the compound, *scholar athlete*, for example, both *scholar* and *athlete* have the skeleton [+material, dynamic ([])] and in the formal part of their body, they share the same features, namely <animate>, <human>, and <function>. Co-indexation of the “R” arguments of these items and the compatibility of both the skeletal and bodily features allows for the complete identification of reference.

(13) <i>scholar</i>	<i>athlete</i>
[+material, dynamic ([_i])]	[+material, dynamic ([_i])]
<animate>	<animate>
<human>	<human>
<function>	<function>
{studies,...}	{plays sport,...}

In exocentric co-compounds, however, there is only partial compatibility of skeletons and bodies. Consider for example the compound *dádzma* ‘sister-brother = siblings’ in (14) from Lieber (2009: 91). This compound is exocentric since it fails the hyponymy test; it is neither a ‘kind of’ *sister* nor a ‘kind of’ *brother*:

(14) <i>dá</i>	<i>dzma</i>
[+material, dynamic ([_i], [])]	[+material, dynamic ([_i], [])]
<animate>	<animate>
<+gender>	<+gender>
<+female>	<-female>
{...}	{...}

Observe that the pragmatic bodies of *dá* and *dzma* differ with respect to the bodily feature <female>; *dá* is <+female>, whereas *dzma* is <-female>. Given that we cannot have a complete identification of reference in this compound (i.e. someone cannot be a brother and a sister at the same time), *dádzma* is interpreted as a collectivity of *brother* and *sister*; i.e. *siblings*.

Lieber argues that a compound such as *dádzma* exhibits *semantic* exocentricity, whereas a co-compound such as *mother-child* opts for *syntactic* exocentricity. According to Lieber, syntactic exocentricity arises when a co-compound such as *mother-child* is predicated of a third noun. A collective reading of *mother-child* is imposed when this compound is predicated of *party*, i.e. a *mother-child party* denotes a party with mothers and children. A different reading arises, however, when *mother-child* is predicated of nouns such as *relationship* or *discussion*; a *mother-child relationship* denotes a relationship “between” a mother and her child.

7.4.2 Exocentric subordinate

As mentioned in Chapter 4, in a subordinate compound there is an argumental relation between the head and the non-head. As exemplified by *burito assembler*, an endocentric subordinate compound consists of a verb (i.e. *assemble*), a suffix which assumes the role of the external argument (i.e. *-er*), and a noun (i.e. *burito*) which serves as the internal argument of the verb.

(15) [+material ([_j])]	[+material, dynamic ([_i], [+dynamic ([_i], [_j])))]
<i>burito</i>	<i>-er</i> <i>assemble</i>

Compare now the endocentric *burito assembler* to the exocentric *pick pocket*:

(16) <i>pick</i>	<i>pocket</i>
[+dynamic ([_{sentient, volitional}], [_i])	[+material ([_i])
<manner>	<-animate>
	<+artifact>
	{contains stuff, an article of clothing,...}

A comparison between the compounds *burrito assembler* and *pick pocket* shows that both compounds have an agentive reading. The latter, however, has no overt affix marking of the agent; *-er* only appears in *burrito assembler*. Lieber argues that the exocentric reading results from the unindexed argument of the verb. In this case, the [*sentient, volitional*] argument of *pick* remains an active (though implicit) argument of the verb. This can explain the agentive reading of the whole compound, despite the fact that there is no overt marking of the agent (for a critical assessment see Section 8.4.2).

7.4.3 Exocentric attributive

Lieber argues that the lexical-semantic representation of an exocentric compound such as *bird brain* in (17a) is not different (in principle) from the representation of an endocentric compound such as *dog bed* in (17b):

(17) a. <i>bird</i>	<i>brain</i>
[+material ([_i])	[+material ([_i])
<+animate>	<-animate>
<-human>	<-artifact>
{flies, lays eggs,...}	{body part, part of nervous system,...}
b. <i>dog</i>	<i>bed</i>
[+material ([_i])	[+material ([_i])
<+animate>	<-animate>
<-human>	<+artifact>
	<function>
{four legs, wags tail,...}	{for sleeping,...}

As in the compound *dog bed*, the dissimilarity of the bodies of the compound members does not allow for the complete identification of reference; as a result *bird brain* cannot

be interpreted as a co-compound. Lieber argues that the exocentric reading of this compound results from *metonymy*. That is, the compound is used metonymically to denote someone who has a brain no bigger than the brain of a bird.

7.5 Problems with exocentric compounds

In what follows, I present some problems with the identification and classification of exocentric compounds which depends on the rather loose hyponymy test.

To begin with, the main problem with the definition and identification of exocentric compounds is that the only thing these compounds have in common is that they are not endocentric. This (negative) definition states what exocentric compounds are not, rather than what they are; exocentric compounds are not endocentric. As a result, a number of formations of distinct formal and semantic make-up are classified as exocentric and assumed sub-types of exocentric compounds overlap.

As mentioned above, Bauer (2010: 167) argues that an exocentric compound can fail the rather loose hyponymy test in three ways: (a) it may not display a head element, (b) it may belong to a lexical category which is not the category of its head, and (c) it may belong to the same category as its head, but its denotatum may be something different than its head element. A basic problem with this approach is that it collapses formal and semantic criteria. As a result, a compound may belong to more than one category. Consider for example the compound *khoh trəw* in (18):

(18) *khoh trəw* wrong + right ‘morality’ (Khmer, Bauer 2010: 172)

This formation is at the same time an exocentric transpositional compound and an exocentric co-compound. In more detail, the relation between the compound members is one of coordination, that is, the compound is a co-compound, but the whole denotes neither *wrong* nor *right*. It is, therefore, an exocentric co-compound. At the same time, however, this compound is listed as transpositional because the whole compound is a noun and not an adjective, despite the fact that both of its constituents are adjectives.

Another problem is that our discussion on hyponymy (Section 4.6) has revealed that no relation of hyponymy can be established between the categorial features of two items. In particular, I argued that the hyponymy test applies to the body and not to the skeleton in which the categorial features of an item are encoded. This asymmetric

nature of hyponymy casts serious doubts on Bauer's claims with respect to the use of the hyponymy test as a diagnostic for the head of the word and whether a word is headed or headless since the word-class of an element is irrelevant to the hyponymy test.

Consider now exocentric synthetic compounds. The criterion for the distinction between endocentric and exocentric synthetic compounds is the absence of overt marking of the external argument of the verb. By way of example, *pick pocket* is exocentric because it does not display the affix *-er* which usually marks the external argument of the verb (compare *pick pocket* to *bus driver*). The use of overt marking as a criterion shows the inconsistency in the identification and classification of exocentric compounds since this criterion is not used for the identification of exocentric compounds which belong to other classes. Overt marking, for example, is not employed in the identification of the class of [N N] bahuvrihis.

7.5.1 Exocentricity and non-compositionality

A pervasive issue in the study of exocentric compounds is the relation between exocentricity and semantic drift. Given that exocentric compounds are those formations which fail the hyponymy test, a number of semantically distinct types of formations are rendered exocentric.

The first issue to be tackled is whether exocentric compounds should be treated as idioms. Katamba (1993) who discusses exocentric compounds and idioms in the same chapter, collapses exocentricity and non-compositionality. He argues that compounds such as *greenhouse* and *lazy-bones* are semantically headless and that they do not exhibit the semantic relationship of head and modifier. That is, *greenhouse* does not denote a house that is green and *lazy-bones* is not a type of lazy bones. Katamba further argues that exocentric compounds are not compositional and that their meaning is opaque. As a result, they should be listed in the lexicon just like idioms.

A second issue is whether lexicalized compounds should be treated as exocentric and therefore headless. By way of example, Scalise et al. (2009: 60) argue that the formation *la media naranja* in (19) is exocentric:

- (19) la [media_A naranja_{N.SG.F}]_{N.SG.F}
 the half orange
 'Mr/Mrs Right'

This formation is considered exocentric since the meaning ‘Mr/Mrs Right’ does not follow from the meaning of *media* and *naranja*. Consider also the compounds *Walfisch* ‘whale-fish = whale’ and *glow-worm*. Bauer (2008b: 53) argues that these formations were formed as endocentric but they became exocentric with time. That is, *Walfisch* is not a hyponym of *fish* and *glow-worm* is no longer a ‘kind of’ worm (Bauer argues that in some places it denotes a *larva* and in other places it is a *beetle*).

The above mentioned compounds are treated as headless by scholarship since due to semantic drift they fail the hyponymy test. In my opinion, non-compositionality should not be identified with the absence of head (*exocentricity*) since several lexical items, complex words and phrases included, are lexicalized and listed in the lexicon. Would we say that these configurations are headless and exocentric? In addition, words other than compounds may develop a meaning which deviates significantly from the meaning of the word in question when it was first formed and used. This would mean that exocentricity is not just a phenomenon which is characteristic of compounding. On the contrary, any configuration, morphological or syntactic, whose elements have changed their meaning or range of denotation since that configuration was first formed, should be classified as exocentric. It is the contention of the present thesis that whether a formation is headed or not, should not be a matter of lexicalization, since a relation between the two notions, that is, *head* and *compositionality*, cannot be established.

7.5.2 Metaphorical compounds

Another problem with the application of the hyponymy test relates to whether metaphorical compounds should be treated as headless. Consider the compound *dust bowl*. This compound fails the hyponymy test in that the whole does not denote a ‘kind of bowl’ but ‘an area with no vegetation, a region reduced to aridity by drought and dust storms’; Sogaard (2004) argues that the failure of the hyponymy test shows that *dust bowl* is exocentric. This problem is similar to the issue of lexicalization since a number of words and phrases can be used metaphorically, but this does not mean that these configurations are headless. In what follows, I list some metaphorical compounds from Greek:

- (20) *ampel-o-gatt-os* < *ampel(i) gatt(os)* Cephalonia
 vineyard-LE-cat-Infl vineyard cat
 1. ‘cat which feeds itself at vineyards’ 2. metaph. ‘malformed person’

<i>alif-o-pit-a</i>	< <i>alif(i)</i>	<i>pit(a)</i>	Epirus
pig_fat-LE-pie-Infl	ointment, pig fat	pie	
1. 'pie with pig fat' 2. metaph. 'who has the habit of flattering'			
<i>antig-o-ksil-o</i>	< <i>antig(o)</i>	<i>ksil(o)</i>	Cephalonia
old-LE-wood-Infl	old	wood	
1. 'old, hard wood' 2. metaph. 'a crusty person'			
<i>arkud-o-gatt-os</i>	< <i>arkud(a)</i>	<i>gatt(os)</i>	Peloponnese
bear-LE-cat-Infl	bear	cat	
1. 'overweight and shaggy cat' 2. metaph. 'a boorish person'			
<i>gatt-o-patysi-a</i>	< <i>gatt(a)</i>	<i>patysi(a)</i>	Sivista
cat-LE-step-Infl	cat	step	
1. 'step of cat' 2. metaph. 'a kind of grass'			

The compounds in (20) can be used both literally and metaphorically. The formation *antigóksilo*, for example, has two readings: (a) it denotes 'an old, hard wood', and (b) it can be used metaphorically to refer to 'a crusty person'. Of importance to our discussion is whether the second reading of this formation renders the compound headless. That is, based on the meaning 'a crusty person', the hyponymy test fails to identify a head; *antigóksilo* does not denote a 'kind of' *ksilo* 'wood', but a person. On the contrary, based on the meaning 'hard wood', the hyponymy test renders the compound headed and therefore endocentric. Instead of proposing that the same compound can be endocentric and exocentric at the same time, it is theoretically justified to propose that these formations are endocentric compounds which can be used metaphorically (Benczes, 2006; Bauer, 2008b).

Although Bauer (2008b) argues that metaphorical compounds are endocentric formations used metaphorically, he nevertheless includes them in his typology of exocentric compounds. This, however, raises another problem since some compounds may belong to more than one category. By way of example, the Cypriot compound *makroxéris* in (21), has two readings: (a) it denotes one who has long hands, and (b) it can be used metaphorically to refer to a thief:

- (21) *makr-o-xer-i-s* < *makr(o) xer(i)*
 long-LE-hand-Dsuf-Infl long hand
 1. ‘who has long hands’ 2. metaph. ‘thief’

Based on the meaning ‘who has X’, *makroxéris* is a bahuvrihi compound, whereas based on the second reading, it is a metaphorical compound. This shows that there is inconsistency in the way we define exocentric compounds since *makroxéris* belongs to two classes of exocentric compounds. In my opinion, the metaphorical use of a compound should not be related to the presence or absence of head. Like simplex words, both endocentric (e.g. *antigóksilo*) and exocentric (e.g. *makroxéris*, bahuvrihi) compounds can be used figuratively to denote a person (or a thing).

7.5.3 Should we split exocentricity?

Let us now turn to whether exocentricity should be split into *categorial*, *semantic*, and *morphological* as recently proposed by Scalise et al. (2009). This proposal rests on the assumption that the notion head can be split into *categorial*, *semantic*, and *morphological*, respectively. Our discussion on the delimitation and definition of head, however, in Chapters 2 and 3, showed that *head* should only be identified with the *category determinant*. A split of the notion head is therefore problematic from a theoretical point of view.

One could of course disagree with the strict categorial way I have defined head in the present thesis, but a closer inspection of the work of Scalise et al. (2009) shows that it is not an easy task to split the notion head (and the notion exocentricity thereof). In order to adduce an example, consider the definitions of the three types of exocentricity proposed by Scalise et al. (2009) which I presented in (11). Although these scholars argue that head can be split into *categorial*, *semantic*, and *morphological*, they only use the term *head* in their definition of *categorial exocentricity*. Neither in *semantic* nor in *morphological exocentricity* is the asymmetric relation between head and non-head employed. In my opinion, this corroborates the idea that the head should only be identified with the *category determinant* and militates against the proposal that head and exocentricity could be split into various types (Kageyama, 2010 also argues that exocentricity should be decided based on the category determinant).

Be that as it may, on the basis of splitting exocentricity into three types, Scalise et al.

(2009: 63-64) have also suggested that semantic exocentricity is independent from the other two types, but semantic and morphological exocentricity interact in such a way that a compound cannot be semantically exocentric and morphologically endocentric. This suggestion is falsified with data from Greek and its dialects. Unless metaphorical compounds do not count as semantically exocentric (see above), the compounds in (20) are such counter-examples; the category and morphological features of the compound come from the second constituent even when these compounds are used metaphorically. In (22), I repeat the compound *gattopatisiá*:

- (22) *gatt-o-patisia* < *gatt(a) patisi(a)* Sivista
 cat-LE-step.F.IC3 cat step.F.IC3
 1. 'step of cat' 2. metaph. 'a kind of grass'

In this compound all morphosyntactic features including gender and inflection class come from the second constituent which is also the category determinant.

The formation *la media naranja* in (19), which appears in Scalise et al. (2009: 60), also falsifies the generalization that whenever a compound is semantically exocentric, it is also morphologically exocentric. Based on the analysis of Scalise et al. (2009), this compound is categorially and morphologically endocentric, but semantically exocentric.

Another generalization, also falsified, dictates that a compound having only one categorial head, which is also the semantic head, must be morphologically endocentric (Scalise et al., 2009: 63). The examples in (23) contradict this generalization:

- (23) *diavol-o-ginek-o* < *diavol(os) ginek(a)* SMG
 devil-LE-woman-Neut.IC5 devil woman.F.IC3
 'devilish woman'
- kefal-o-vris-o* < *kefal(i) vris(i)* SMG
 head-LE-spring-Neut.IC5 head spring.F.IC3
 'head spring'
- ampel-o-paxt-on* < *ampel(i) paxt(os)* Cypriot
 vineyard-LE-land_rent-Neut.IC5 vineyard land rent.M.IC1
 'vineyard tax'

These compounds are semantically and categorially endocentric, but their gender and inflection class are different from those of their head. The Cypriot *ampelópaxton*, for

example, is of neuter gender and inflects according to IC5, whereas *paxt(os)* is masculine and belongs to IC1.

Along the same lines, Scalise and Fábregas (2010: 125) claim that “[w]henever a compound is morphologically exocentric, it is also true that its semantic type cannot be derived from the denotation of any constituent, at least without any additional meaning operation such as metaphor or metonymy”. Once more, data from both SMG, Italiot, and Cypriot do not support this claim, since there are several compounds whose morphological properties, such as gender or inflection class, differ from the morphological properties of their head element, but do not exhibit any kind of semantic drift. The following compounds serve as indicative examples:

- (24) *glik-o-kath-o* < *glik(o) (a)kath(i)* Italiot
 sweet-LE-thorn-Neut.IC5 sweet thorn.Neut.IC6
 ‘sweet thorn’
- imis-o-kalam-o* < *imis(o) kalam(i)*
 half-LE-reed-Neut.IC5 half reed.Neut.IC6
 ‘half reed’
- afr-o-pull-on* < *afr(os) pull(in)* Cypriot
 foam-LE-bird-Neut.IC5 foam bird.Neut.IC6
 ‘bird of the waves’
- aggur-o-xoraf-on* < *aggur(in) xoraf(in)*
 cucumber-LE-field-Neut.IC5 cucumber field.Neut.IC6
 ‘cucumber field’
- aspr-o-mel-on* < *aspr(on) mel(in)*
 white-LE-honey-Neut.IC5 white honey.Neut.IC6
 ‘white-coloured honey’

A typical example is the Cypriot *aspromelon* which displays a different inflectional ending (*-on*) from that of its head element (*-in*), but no extra semantic operation is needed in order to derive the meaning of the compound.

7.6 Metonymy or/and derivation

The analysis of exocentric compounds, in general, and bahuvrihis, in particular, and their relevance for morphological theory are frequently debated issues among scholars. In what follows, I present the two distinct ways bahuvrihi compounds have been analyzed by scholarship.

Consider the compound *red-head* which denotes ‘someone with red hair’. This formation exhibits the same attributive relation between its members as the endocentric *blackbird*. In addition, in both compounds, the second constituent is responsible for the determination of the lexical category of the whole; that is, both compounds are nouns and not adjectives. These compounds, however, differ with respect to their denotation, since *blackbird* denotes a ‘kind of’ bird, whereas *redhead* does not refer to a ‘kind of’ head that is red. The question which arises is the following: Where does the extra meaning ‘who has X’ come from in *redhead*?

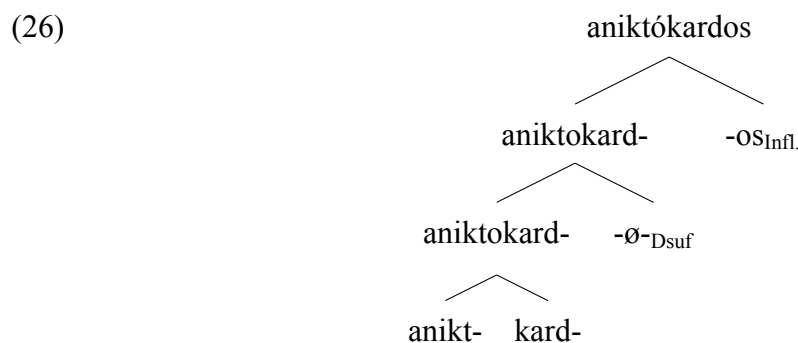
A possible solution to this issue is to assume that bahuvrihis, such as *redhead*, are a special semantic category of endocentric compounds. In fact, several authors have argued that bahuvrihi compounds are a category of endocentric compounds which is based on metonymy (Booij, 2002, 2007; Bauer, 2008b; Lieber, 2004, 2005, 2009). In other words, bahuvrihis are instances of the stylistic trick *pars pro toto* according to which a salient feature/part of an entity is used to denote the whole entity (part for whole). By way of example, *redhead* is used metonymically to denote ‘a person who has red hair’.

Another solution to this issue is to assume that *redhead* undergoes zero-derivation. That is, the meaning ‘who has X’ comes from a zero-suffix which attaches to the configuration *redhead* (Marchand, 1969; Kiparsky, 1982; Sproat, 1988; Kastovsky, 1992, 2005). The schema in (25) illustrates this derivation:



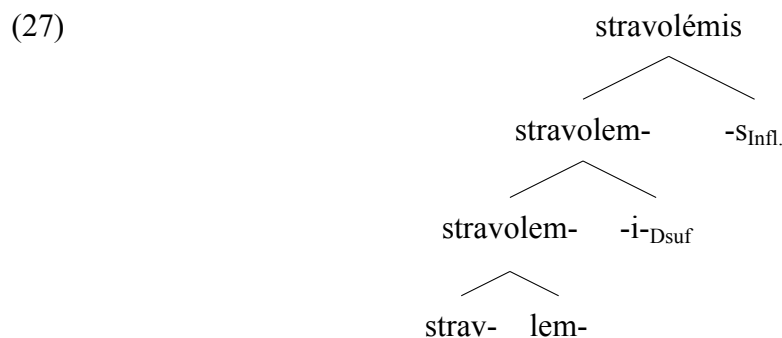
The zero-affix in this case is responsible for the feature [+human] and the meaning ‘who has X’.

The analysis of bahuvrihi compounds as bearing a suffix which is responsible for the category and the semantics of the formation has been proposed by Ralli (2005, 2007, 2009b, 2013) and Ralli and Andreou (2012) for Greek as well. Consider for example the Greek compound *aniktókardos* ‘open hearted’ (< *anikt(i)* ‘open’ + *kardi(a)* ‘heart’):



Observe that in this example a zero-suffix attaches to the configuration *aniktokard-* ‘open heart’ which is the result of the combination of the stems *anikt-* and *kard-*.

Although this type of bahuvrihis will be analyzed in detail in the next chapter, I would like to mention that an argument in favour of the postulation of a zero affix comes from other bahuvrihi compounds which have an overt suffix, namely *-i*. Consider the compound *stravolémis* ‘crooked-necked’ (< *strav(os)* ‘crooked’ + *lem(os)* ‘neck’):



A comparison between *aniktókardos* and *stravolémis* shows that both are bahuvrihis and that they are based on the same structural pattern. That is, they both involve compounding and derivation. The only difference is that in the former the affix is covert whereas in the latter it is overt.

7.6.1 Nominal and adjectival bahuvrihis

Although metonymy and suffixation are considered diametrically opposite views on the analysis of bahuvrihi compounds, it is the contention of the present thesis that both analyses are theoretically motivated and justified. Based on the distinction between nominal and adjectival bahuvrihis, I will show that the former should be analyzed as endocentric compounds based on metonymy and that the latter can be better understood if a relation between compounding and derivation is established.

Let us comment on the use of zero-affixation in compounds of the *redhead* type. In my opinion, the postulation of a zero-affix in bahuvrihis of the *redhead* type is not well justified since the function of this affix is not particularly clear. As illustrated in (25), this affix is responsible for the feature [+human] (Bauer, 2008b) and the meaning ‘who has X’, but it is not clear, at least to me, whether this should be a motivation for the introduction of a zero-suffix.

A basic problem with the assumption that compounds such as *redhead* are the result of zero-derivation relates to whether we should allow for zero-affixes in other compounds which exhibit semantic drift. Consider the metaphorical compound *antigóksilo* which denotes ‘an old, hard wood’ and can be used metaphorically to refer to ‘a crusty person’. A comparison between *redhead* and *antigóksilo* shows that although the head of each formation is [–human], both compounds can be used to refer to a person, i.e. [+human]. If we, however, accept that the change in the value of the semantic feature [human] in the case of *redhead* should be attributed to zero-suffixation, we would have to assume that such a suffix exists in metaphorical compounds as well. This would introduce unnecessary complexity into the study of compounds.

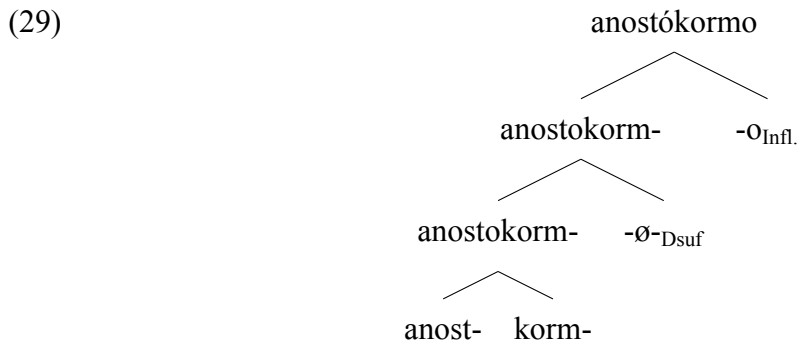
7.6.1.1 Nominal and adjectival bahuvrihis in Greek

Let us now turn to the way the distinction between nominal and adjectival bahuvrihis manifests itself in Greek compounding. Although the bulk of Greek bahuvrihi compounds belongs to the adjectival type, nominal bahuvrihis are manifested by few examples which can nevertheless greatly inform our discussion; (28) gives some examples of Greek nominal bahuvrihis (it should be noted that this type of compounding has never been commented on in Greek literature):

- (28) *arkud-o-mutr-o* < *arkud(a) mutr(o)* HDMG: s.v. *αρκουδόμουτρο*
 bear-LE-face-Infl bear face
 1. ‘the face of bear’ 2. ‘who has the face of a bear, a malformed person’
- void-o-kili-a* < *void(o) kili(a)* Peloponnese, Naxos
 ox-LE-belly-Infl ox belly
 1. ‘ox-belly’ 2. ‘who has a big belly’
- vu-kran-on* < *vu(s) kran(a)* Kos
 ox-head-Infl ox head
 1. ‘ox-head’ 2. ‘a silly person’
- vrom-o-gloss-a* < *vrom(iki) gloss(a)* HDMG: s.v. *βρωμόγλωσσα*
 filthy-LE-tongue-Infl filthy tongue
 1. ‘a filthy tongue’ 2. ‘who has a filthy tongue’
- gaidur-o-korm-o* < *gaidur(i) korm(i)* Milos
 donkey-LE-body-Infl donkey body
 ‘a boorish person’
- anost-o-korm-o* < *anost(o) korm(i)* HDMG: s.v. *ανοστόκορμο*
 bad_shaped-LE-body-Infl bad-shaped body
 ‘who has a bad-shaped body’

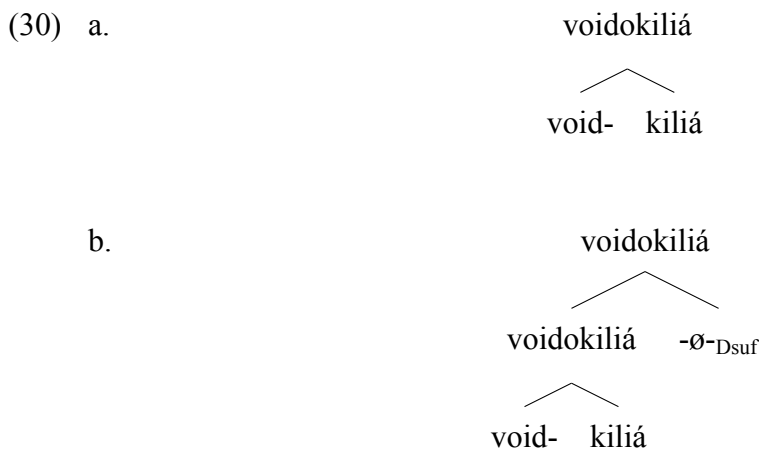
Observe that most of these formations have two meanings, a literal and a figurative one. The formation *arkudómutro*, for example, denotes the ‘face of a bear’ and ‘a malformed person’ (bahuvrihi). In a similar vein, *vromóglossa* refers to both ‘a filthy tongue’ and to ‘a person with a filthy tongue’ (bahuvrihi). Other formations, nevertheless, only serve as bahuvrihi compounds (of the *redhead* type) since they do not necessarily have a literal meaning. By way of example, the compound *anostókormo* denotes ‘one who has a bad-shaped body’ and not ‘a bad-shaped body’. Similarly, *gaidurókormo* does not refer to ‘the body of a donkey’ but to ‘a boorish person’.

Let us now turn to whether the use of these compounds with the meaning ‘who has X’ (bahuvrihi) renders these formations true exocentric compounds. Based on the zero-derivation hypothesis, the structure of *anostókormo* is the following:



Observe that the formation *anostokorm-* ‘bad-shaped body’ undergoes suffixation; the zero-affix is responsible for the feature [+human] and the meaning ‘who has X’.

The second solution available to us is to assume that *anostókormo* is an endocentric compound which can be used metonymically to denote a person. Evidence in favour of the second solution comes from compounds which can be used with a literal and a figurative meaning. By way of example, the zero-derivation hypothesis runs into problems when one takes into consideration the structure of a compound such as *voidokiliá*:



(30a) illustrates *voidokiliá* with the meaning ‘ox-belly’ and (30b) corresponds to the exocentric reading of this compound, i.e. ‘who has a big belly’. A basic problem with the zero-derivation hypothesis is that it forces us to propose two different structures for the same word. One with and one without derivation.

The zero-derivation proposal faces another problem. Given that stress and inflection follows the word constituent *kiliá*, *voidokiliá* belongs to the [stem word] pattern of Greek compounds (Nespor and Ralli, 1996). It is, therefore, highly problematic to assert that *voidokiliá* undergoes zero-suffixation as depicted in (30b), since suffixation requires a [stem/word stem] pattern and not a [stem word] one. That is, the second constituent can

never be a word. *kiliá* in *voidokiliá*, however, appears as a word and not as a stem.⁵

Instead of proposing two different structures, one for each meaning, I will assume along with other scholars that Greek nominal bahuvrihis are endocentric compounds based on metonymy. That is, in the case of *voidokiliá*, the salient feature of an entity with a big belly is used to denote the whole entity.

It should be stressed that the distinction between nominal and adjectival bahuvrihis manifests itself in an interesting way since most of the nominal compounds in (28), have an adjectival counterpart. Consider the following:

- (31) *void-o-kili-a* N *void-o-kil-i-s* A < *void(o) kili(a)*
 ox-LE-belly-Infl ox-LE-belly-Dsuf-Infl ox belly
 ‘who has a big belly’
- vrom-o-stom-a* N *vrom-o-stom-ø-os* A < *vrom(iko) stom(a)*
 filthy-LE-mouth-Infl filthy-LE-mouth-Dsuf-Infl filthy mouth
 ‘who has a filthy mouth’
- gaidur-o-mutr-o* N *gaidur-o-mutr-i-s* A < *gaidur(i) mutr(o)*
 donkey-LE-face-Infl donkey-LE-face-Dsuf-Infl donkey face
 ‘a malformed person’
- vrom-o-gloss-a* N *vrom-o-gloss-ø-os* A < *vrom(iki) gloss(a)*
 filthy-LE-tongue-Infl filthy-LE-tongue-Infl filthy tongue
 ‘who has a filthy tongue’

A basic difference between the nominal *vromóglossa* and the adjectival *vromóglossos* is that the former cannot appear as an attributive modifier (32a), whereas the latter can modify a noun as in (32b):

- (32) a. **O* *vromóglossa* *ánthropos*.
 The.M.SG filthy-tongue.N.F.SG man.N.M.SG
- b. *O* *vromóglossos* *ánthropos*.
 The.M.SG filthy-tongued.A.M.SG man.N.M.SG

Notice that in (32b), there is agreement between the adjectival *vromóglossos* and the noun *ánthropos*; both are masculine singular. This is important since adjectives in Greek

⁵For more on this see Chapter 8.

must agree with the noun they modify in number and gender (Ralli, 2000). Consider for example the modification of a [+female] noun:

- (33) a. **I vomóglossa ginéka.*
 The.F.SG filthy-tongue.N.F.SG woman.N.F.SG
- b. *I vomóglossi ginéka.*
 The.F.SG filthy-tongued.A.F.SG woman.N.F.SG

In (33b), we observe that the adjectival *vromogloss-* ‘filthy-tongued’ appears with the inflectional suffix *-i* since it agrees in gender and number with the feminine *ginéka* ‘woman’. (33a) is ungrammatical despite the fact that there is agreement in gender and number between *vromóglossa* and *ginéka*; *vromóglossa* is a nominal bahuvrihi and as such, it cannot appear as an attributive modifier between the article *i* and the noun *ginéka*.

Another difference between nominal and adjectival bahuvrihis is that the latter are always based on the structural pattern [stem stem] and never on the pattern [stem word]. By way of example, the nominal *voidokiliá* belongs to the pattern [stem word], since the position of stress and the inflectional suffix follow the word *kiliá*, whereas the adjectival *voidokilis* is a [stem stem] compound. In addition, *voidokilis* exhibits the derivational suffix *i ~ id* which is characteristic of Greek adjectival bahuvrihis.

Another fundamental difference between the two types is that an adjectival bahuvrihi such as *vromóstomos* can never refer to ‘a filthy mouth’ but only to ‘someone who has a filthy mouth’. On the contrary, the nominal *vromóstoma* can denote ‘a filthy mouth’ and ‘someone with a filthy mouth’ via metonymy. In a similar vein, *voidokilis* never denotes an ‘ox-belly’, whereas *voidokiliá* has both a literal and a figurative meaning; i.e. ‘ox-belly’ and ‘who has a big belly’ respectively.

As a last remark I would like to mention that the distinction between nominal and adjectival bahuvrihis is also supported by historical research. Research on *bahuvrihi* compounds (Brugmann, 1889; Jacobi, 1897) shows that this category can be split into two sub-categories: (a) adjectival and (b) nominal *bahuvrihis*. Given the preponderance of adjectival bahuvrihis in languages such as Greek and Sanskrit, it is assumed that nominal *bahuvrihis* are the result of a nominalization process.

Although in most IE languages, adjectival bahuvrihis are more basic than nominal

ones, Germanic languages followed a different route. Kastovsky (2009) argues that contrary to other IE languages, Germanic languages developed a very productive nominal bahuvrihi compounding system of the *paleface* type and also states that the adjectival pattern is manifested by only a handful of formations such as *barefoot*. In addition, he shows that adjectival bahuvrihis have been replaced by the so-called *extended bahuvrihis* which involve suffixation; *hunchbacked* < *hunchback*. A detailed analysis of this kind of bahuvrihi compounds will be presented in the next chapter.

7.7 Conclusions

The purpose of this chapter was two-fold: (a) to serve as an introduction to the distinction between *endocentric* and *exocentric* compounds, and (b) to critically evaluate literature on this issue.

In Section 7.5, I presented some of the problems with the identification and classification of exocentric compounds since a number of formally and semantically distinct formations may be considered exocentric. As a result, some categories such as *exocentric co-compounds* and *transpositional* may overlap. In addition, I focused on the relation between exocentricity and non-compositionality and tackled the issue whether metaphorical compounds should be treated as exocentric. In Section 7.3, I presented data which militates against the recent proposal that exocentricity and the notion head can be split into *morphological*, *semantic*, and *categorial* (Scalise et al., 2009) and argued that the study of exocentricity should focus on the *category determinant*.

Finally, based on the distinction between nominal and adjectival bahuvrihis, which is often not taken into consideration by scholars, I argued that the former should be analyzed via metonymy and that the latter can be better understood if we examine the relation between compounding and derivation. The following chapter addresses in more detail the relation between the two word-formation processes.

Compounding and derivation

In the previous chapter I argued that nominal bahuvrihis should be analyzed as endocentric compounds which are interpreted metonymically, whereas adjectival bahuvrihis should be accounted for by derivation (overt or zero). This means that a compound such as *aniktókardos* ‘open-hearted’ combines compounding and derivation and belongs to the class of *extended bahuvrihis*. The purpose of this chapter is to delve more deeply into the way the relation between the two word-formation processes, compounding and derivation, manifests itself in Greek compounding.

More specifically, in Section 8.1, I briefly introduce the relation between compounding and derivation and comment on the demarcation of these processes. In Section 8.2, I focus on the analysis of bahuvrihi compounds and present data from previous evolutionary stages of Greek and other languages which argues in favour of the proposal that adjectival bahuvrihis should be dealt with by derivation (overt or zero). In Section 8.3, I focus on the order of application between derivation and compounding and analyze bahuvrihi compounds as *bracketing paradoxes*. In Section 8.4, I delve more deeply into the analysis of prepositional and verb-first compounds and in Section 8.5, I present the various structural schemata of endocentric and exocentric compounds. Finally, in Section 8.6, I comment on the demarcation between de-compounds and exocentric com-

pounds and argue that exocentricity is compounding for the purposes of derivation.

8.1 The relation between compounding and derivation

In recent years there has been an upsurge of interest in the study of the relation between derivation and compounding and several theoretical approaches have been developed (Ackema and Neeleman, 2004; Bauer, 2005; Booij, 2005a; Štekauer, 2005; Ralli, 2010; Ralli and Andreou, 2012).

A first issue is the demarcation of compounding and derivation. The main criterion for the demarcation of these processes relates to the building blocks used by each process. That is, derivation involves an affix which is a bound morpheme and a lexeme, and compounding involves the combination of two (or more) lexemes into a new word.

The demarcation of derivation and compounding is also relevant to the relation between morphology and syntax. On the one hand, Item and Arrangement models focus on the similarities between derivation and compounding and propose a rather unified account of the two processes. On the other hand, Item and Process models argue that derivation and compounding are not related processes and that they belong to different components of grammar.

In more detail, Item and Arrangement models (see for example Lieber, 1980) assume that both free and bound morphemes are lexical items. This means that both have full entries in the Lexicon and also bear a category label. By way of example, the affix *-ize* and the word *go* belong to the same category, namely verb. In IA models, the demarcation between compounding and derivation is reduced to a single property of derivational affixes; affixes are bound. More analytically, Lieber (1980: 81) states that affixes in their lexical entry come with a subcategorization frame that makes them bound, in that, they can only appear when combined with a stem that meets their selectional properties. On the contrary, stems are not subcategorized and are, therefore, free items.

Other models of morphology, nevertheless, argue that derivation and compounding are executed by radically different sets of rules. Anderson (1992), for example, argues that derivation consists of Word Formation Rules which operate on lexemes to derive other lexemes, whereas compounding is executed by Word Structure Rules which be-

long to the Syntax of language.

A number of phenomena militate against the idea that derivation and compounding should be considered as fundamentally different processes. Certain morphemes, for example, exhibit properties which can classify them as both affixes and stems. By way of example, consider the unclear status of *affixoids*. This classificatory term denotes morphemes which have properties of full words and affixes. That is, they occur as independent lexemes, but have a restricted meaning when they participate in word-formation processes. An example is offered by Booij (2005a) who argues that *vrij* ‘free’ can be considered as affixoid:

- (1) *stof-vrij* ‘lit. dust-free, without dust’

The lexeme *vrij* only has the meaning ‘free’ when used in word formation, despite the fact that as an independent word it can have several meanings.

Evidence in favour of the idea that derivation and compounding belong to the same grammatical component, namely morphology, comes from certain constraints which apply on derived words when the latter appear inside compounds. Consider the following examples:

- (2) a. *alon-o-ther-iz-o* < *alon-iz-o* *ther-iz-o*
 thresh-LE-reap-Dsuf-Infl thresh-Dsuf-Infl reap-Dsuf-Infl
 ‘thresh and reap’
- b. *klid-ampar-on-o* < *klid-on-o* *abar-on-o*
 lock-bar-Dsuf-Infl lock-Dsuf-Infl bar-Dsuf-Infl
 ‘padlock’

The formations in (2) are co-compounds which consist of two verbs, *alonizo* and *therizo* in *alonotherizo* and *klidono* and *abarono* in *klidabaronono* respectively. A closer inspection of these formations reveals that the first member appears deprived of affixal material. That is, *alonizo* and *klidono* appear in the form *alon-* and *klid-* without the derivational suffixes *-izo* and *-ono* respectively. This has led Ralli and Karasimos (2009) and Ralli (2010, 2013) to propose the *bare-stem constraint* which masks the overt realization of affixes on the first constituent of a compound. Of importance to the relation between compounding and derivation is that this constraint shows that compounding has access into the internal structure of derived words. As a result, compounding and

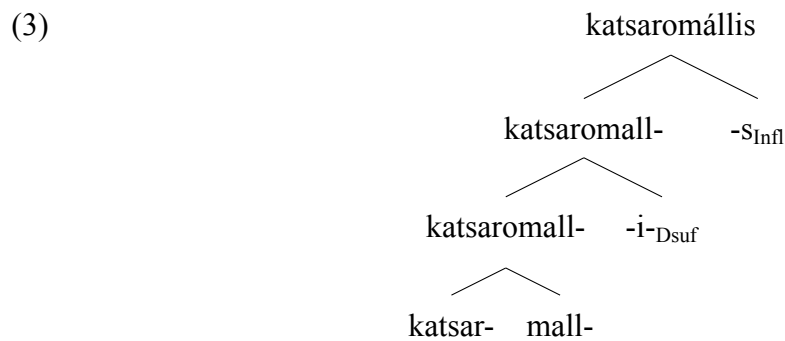
derivation cannot be considered radically different processes which belong to different components of grammar.

In the following sections I will comment on a different aspect of the relation between compounding and derivation, that is, the order of application between the two, and I will focus on formations in which the two word-formation processes co-occur.

8.2 The structure of bahuvrihi compounds

As argued for in the previous chapter, a basic difference between nominal and adjectival Greek bahuvrihi compounds is that the former can be considered as endocentric compounds interpreted metonymically, whereas the latter cannot be accounted for via metonymy. That is, the nominal endocentric *voidokiliá* ‘ox-belly’ can be used metonymically to denote ‘one with a big belly’. On the contrary, the adjectival exocentric *voidokilis* ‘one with a big belly’ has the same meaning as *voidokiliá*, when the latter is used metonymically, but the properties of the former, such as its adjectival use, do not derive from metonymy. It should be noted that Booij (2007: 80) also draws our attention to the fact that the Latin bahuvrihis *auri-com-us* ‘having golden hair’ and *magn-anim-us* ‘magnanimous’ (Oniga, 1992) cannot be accounted for in terms of metonymy since they are adjectives.

As argued for by Ralli (2005, 2007, 2013), Andreou (2010), and Ralli and Andreou (2012), Greek exocentric compounds have a head inside their word limits, which gives them the basic category, meaning, and morphosyntactic features, but this head lies outside the confines of the structure involving the combination of two lexemes. The head is a derivational suffix, which is added at the periphery of this combination, and before the completion of the compound word with the addition of a closing inflectional ending. Thus, the head is part of the word structure and does not have to be inferred, as has been argued by Dressler (2006: 33). For instance, in a compound such as the Cypriot *katsaromállis* ‘who has curly hair’, the head, namely the derivational suffix *-i*, follows the combination of the two stem constituents, *katsar-* ‘curly’ and *mall-* ‘hair’, and precedes the inflectional ending *-s*:



As claimed by Ralli (2005, 2007), the final vowel /i/ in exocentric compounds such as *katsaromállis* is a derivational suffix, and not the ending of the noun *mállí* ‘hair’, when the latter is taken as an independent word. Significant proof for this claim is the fact that, in plural, *-i-* is substituted by an allomorphic variation *-id-* (*katsar-o-mall-id-es* ‘curly-LE-hair-Dsuf-PL’). On the contrary, the word final *-i* of *mállí* remains unchanged in the plural number (*mállí-a* ‘hair.PL’).

8.2.1 Zero-derivation in bahuvrihi compounds

It should be noticed that several adjectival bahuvrihi compounds do not bear an overt derivational suffix. Consider the following examples from Cypriot and the dialects of Southern Italy:

- (4) a. *avr-o-xil-os* < *avr(o) xil-os* Cypriot
 soft-LE-lip-A.M soft lip-N.Neut
 ‘soft-lipped’
- b. *adr-o-mutsun-os* < *adr(i) mutsun-a*
 coarse-LE-face-A.M coarse face-N.F
 ‘coarse-faced’
- c. *anark-o-frid-os* < *anark(o) frid-in*
 sparse-LE-eyebrow-A.M sparse eyebrow-N.Neut
 ‘with wide-apart eyebrows’
- d. *mon-o-vidz-o* < *mon(o) vidz-i* Italiot
 single-LE-breast-A.M single breast-N.Neut
 ‘who has only one breast’

- e. *plat-o-fidd-o* < *plat(i) fidd-o*
 broad-LE-leaf-A.Neut broad leaf-N.Neut
 ‘broad-leaved tree’
- f. *aspr-o-kefal-o* < *aspr(o) kefal-i*
 white-LE-head-A.M white head-N.F
 ‘with white hair’

A morphemic analysis of the Italiot *asprokéfalo* ‘with white hair’ shows that this formation can be decomposed into the adjective *aspr-* ‘white’, the noun *kefal(i)* ‘head’, and the inflectional suffix *-o*. Contrary to other bahuvrihis with an overt suffix, in *asprokéfalo* there is no marker responsible for the adjectival use and the meaning ‘who has X’.

A possible solution to this issue would be to assume that the compounds in (4) are used metonymically to denote ‘one who has X’. Metonymy, however, cannot explain the exocentricity of these formations since these are adjectival bahuvrihi compounds. As we saw in the previous chapter, only nominal bahuvrihis can be accounted for via metonymy. In addition, we presented minimal pairs of nominal and adjectival bahuvrihis which highlight the difference between the two types. Consider for example the pair *vromóstoma/vromóstomos* in (5):

- (5) a. *vrom-o-stom-a* HDMG: s.v. *βρωμόστομα*
 filthy-LE-mouth-N.Neut
 ‘who has a filthy mouth’
- b. *vrom-o-stom-ø-os* HDMG: s.v. *βρωμόστομος*
 filthy-LE-mouth-Dsuf-A.M
 ‘who has a filthy mouth’

In this pair, the nominal *vromóstoma* can be used metonymically to denote one ‘who has a filthy mouth’ but this solution cannot be extended to *vromóstomos* which has the same meaning as *vromóstoma*; *vromóstomos* is an adjectival bahuvrihi.

Observe that the compounds in (4) have the same structure as *vromóstomos*. By way of example, *vromóstomos*, the Cypriot *adromútsunos* ‘coarse-faced’, and the Italiot *asprokéfalo* ‘with white hair’ are composed of two nominal stems and are classified as adjectival bahuvrihis despite the fact that there is no overt suffix marking the change

from noun to adjective.

8.2.1.1 Arguments for zero-derivation

A second solution would be to assume that these formations undergo zero-derivation. In what follows, I focus on the question of zero-derivation and offer arguments in favour of the proposal that the compounds in (4), such as *adromútsunos*, are zero-derivatives. First, I provide data from previous evolutionary stages which show that Greek adjectival compounds involve two stems plus a derivational suffix.

The presence of an overt derivational suffix is evident in Ancient Greek as exemplified by the compounds in (6):

(6) *hom-o-patr-i-os* < *hom(os) pat(e:r)*
 same-LE-father-Dsuf-Infl same father
 ‘by the same father’

hom-o-gastr-i-os < *hom(e:) gast(e:r)*
 same-LE-womb-Dsuf-Infl same womb
 ‘from the same womb’

trite:-mor-i-os < *trit(e:) mor(a)*
 third-part-Dsuf-Infl third part
 ‘equal to a third part’

hexa-daktul-iai-os < *hex daktul(os)*
 six-finger-Dsuf-Infl six a measure of length, finger’s breadth
 ‘six inches long’

eikosa-mn-ai-os < *eikos(i) mn(a)*
 twenty-mina-Dsuf-Infl twenty mina
 ‘weighing twenty minae’

hexa-me:n-iai-os < *hex me:n*
 six-month-Dsuf-Infl six month
 ‘lasting six months’

Observe that in these examples, an adjectival suffix attaches to the combination of two stems. More analytically, in the compound *hom-o-patr-i-os*, the derivational suffix *-i-* attaches to the combination of the stem forms of the words *homos* and *pate:r*. In a

similar vein, another suffix, namely *-ai-*, combines with the formation *eikosa-mn-* to derive the adjectival *eikosa-mn-ai-os*. The formation *hexa-daktul-iai-os* also bears an overt suffix, namely *-iai-*.

Two observations are of major importance for our study. The first is that these exocentric compounds exhibit an overt derivational suffix. This shows the relation between compounding and derivation since the two processes co-occur and the output of one process can serve as an input to the other. Second, a number of compounds with overt suffixation have a counterpart with no overt affix. Consider the following minimal pairs:

- (7) a. *hexa-daktul-iai-os* *hexa-daktul-ø-os*
 six-finger-Dsuf-Infl six-finger-Dsuf-Infl
 ‘six inches long’
- b. *hekte:-mor-i-os* *hekte:-mor-ø-os*
 sixth-part-Dsuf-Infl sixth-part-Dsuf-Infl
 ‘those who paid a sixth of the produce as rent’
- c. *hexa-me:n-iai-os* *hexa-me:n-ø-os*
 six-month-Dsuf-Infl six-month-Dsuf-Infl
 ‘lasting six months’

By way of example, *hexa-daktul-iai-os* and *hexa-daktul-ø-os* in (7a) have the same meaning and function but differ only with respect to the presence of the affix *-iai-* in the former. In a similar vein, in the minimal pair *hekte:-mor-i-os* and *hekte:-mor-ø-os*, there is no overt marking of the suffix which is responsible for the categorial and semantic features of the latter, despite the fact that *hekte:-mor-i-os* bears the suffix *-i-*.

Another very productive suffix which attaches to combinations of stems, is the adjectival *-atos*. The *Dictionary of Medieval Vulgar Greek Literature (1100-1669)* (Kriaras, 1969) lists several adjectival bahuvrihi compounds which consist of two stems and the adjectival suffix *-at-(os)*. Consider the following examples:

- (8) *alithin-o-ptern-at-os* < *alithin(i) ptern-a*
 red-LE-heel-Dsuf-A.M red heel-N.F
 ‘who has red heels’

- aspr-alog-at-os* < *aspr(o) alog-o*
white-horse-Dsuf-A.M white horse-N.Neut
‘who has a white horse’
- dipl-o-kalamar-at-os* < *dipl(o) kalamar-i*
double-LE-inkhorn-Dsuf-A.M double ink horn-N.Neut
‘who has a double ink-horn’
- kont-ourad-at-os* < *kont(o) urad-i*
short-tail-Dsuf-A.M short tail-N.Neut
‘with a short tail’
- kuts-o-pod-at-os* < *kuts(o) pod-i*
lame-LE-leg-Dsuf-A.M lame leg-N.Neut
‘whose legs have been cut off’
- lampr-o-pukamis-at-os* < *lampr(o) pukamis-o*
bright-LE-shirt-Dsuf-A.M shining, bright shirt-N.Neut
‘with a luxury shirt’
- lign-o-pigun-at-os* < *lign(o) pigun-i*
slim-LE-chin-Dsuf-A.M slim chin-N.Neut
‘with a slim chin’
- megal-o-xaxal-at-os* < *megal(i) xaxal-a*
big-LE-claws-Dsuf-A.M big claw-N.F
‘with big claws’

Observe that in these examples, the suffix *-at(os)* attaches to the combination of two stems. By way of example, *alithinopternátos* ‘who has red heels’ consists of the stems *alithin-* ‘red’ and *ptern-* ‘heel’, and the suffix *-atos* which is responsible for the meaning ‘who has X’ and the categorial feature Adjective. Similarly, the bahuvrihi *lignopigunátos* ‘with a slim chin’ is composed of two stems plus the suffix *-atos*.

Adjectival compounds formed by the suffixation of *-at(os)* are also attested in various Modern Greek dialects. (9) contains some indicative examples:

- (9) *aggel-o-frid-at-os* < *aggel(os) frid-i* Siros
angel-LE-eyebrow-Dsuf-A.M angel eyebrow-N.Neut
‘who has angel-like eyebrows’

<i>argir-alisid-at-os</i>	< <i>argir(o) alisid-i</i>	Karpathos
silver-chain-Dsuf-A.M	silver chain-N.Neut	
‘tied with silver chains’		
<i>argir-o-zonar-at-os</i>	< <i>argir(o) zonar-i</i>	Macedonia
silver-LE-belt-Dsuf-A.M	silver belt-N.Neut	
‘with a belt inlaid with silver’		
<i>asim-o-vraxiol-at-os</i>	< <i>asim(i) vraxiol-i</i>	Zakynthos
silver-LE-bracelet-Dsuf-A.M	silver bracelet-N.Neut	
‘with a silver bracelet’		
<i>aspr-o-daktil-at-i</i>	< <i>aspr(o) daktil-o</i>	HDMG: s.v. ασπροδακτυλάτη
white-LE-finger-Dsuf-A.F	white finger-N.Neut	
‘with white fingers (for a woman)’		
<i>aspr-o-kaltsun-at-os</i>	< <i>aspr(o) kaltsun-i</i>	Paxoi
white-LE-legging-Dsuf-A.M	white leggings-N.Neut	
‘with white leggings’		
<i>garifall-o-xnot-at-os</i>	< <i>garifall(o) xnot-o</i>	Crete
clove-LE-breath-Dsuf-A.M	clove breath-N.Neut	
‘whose breath smells like cloves’		

Of importance to our study on zero-derivation is that minimal pairs of adjectival *bahuvrihis* which consist of compounds with an overt suffix, in this case *-at-(os)* and a covert (zero)-suffix appear in dialects and previous evolutionary stages. Consider the following:

- (10) a. *evmorf-o-prosop-at-os* *evmorf-o-prosop-ø-os*
beautiful-LE-face-Dsuf-Infl beautiful-LE-face-Dsuf-Infl
‘with a beautiful face’
- b. *aggel-o-misid-at-os* *aggel-o-misid-ø-os*
angel-LE-face-Dsuf-Infl angel-LE-face-Dsuf-Infl
‘with an angel-like face’
- c. *anikt-o-kutal-at-os* *anikt-o-kutal-ø-os*
broad-LE-shoulder-Dsuf-Infl broad-LE-shoulder-Dsuf-Infl
‘with broad shoulders’

- d. *aspr-o-mantil-at-os* *aspr-o-mantil-ø-os*
 white-LE-headscarf-Dsuf-Infl white-LE-headscarf-Dsuf-Infl
 ‘with a white headscarf’

Observe that the derivational suffix which gives the adjectival category and the basic meaning ‘who has X’ to the entire word, is not overtly realized in the second member of these minimal pairs, despite the fact that the first member bears the suffix *-at-*. To adduce an example, *aniktokútalos* has a zero-suffix, whereas *aniktokutalátos*, which has the same meaning as *aniktokútalos*, bears the suffix *-atos*. It should be noted that both *aniktokútalos* and *aniktokutalátos* in (10c) come from the same dialect, namely Cypriot.

Consider also minimal pairs of bahuvrihi compounds with the suffix *-i-* ~ *-id-* and a zero-suffix from the Cypriot dialect:

- (11) a. *katsar-o-mall-i-s* *katsar-o-mall-ø-os*
 curly-LE-hair-Dsuf-Infl curly-LE-hair-Dsuf-Infl
 ‘with curly hair’
- b. *makr-o-nur-i-s* *makr-o-nur-ø-os*
 long-LE-tail-Dsuf-Infl long-LE-tail-Dsuf-Infl
 ‘with a long tail’

By the overt analogue criterion (Sanders, 1988), compounds such as *katsar-o-mall-os* ‘curly-LE-hair-Infl’ which do not exhibit overt affixation should be treated as analogous to formations such as *katsar-o-mall-i-s* ‘curly-LE-hair-DsufA-Infl’, and should, therefore, be analyzed as involving zero-derivation, i.e. *katsar-o-mall-ø-os* ‘curly-LE-hair-DsufA-Infl’.

The presence of a zero-suffix in exocentric compounds is further corroborated by the fact that this covert suffix exhibits properties of overt suffixation.¹ There exist, for example, exocentric compounds which exhibit an allomorphic behaviour that can only be explained by zero-derivation. Consider the following examples:

- (12) *aspr-o-kimat-os* *kima-* ~ *kimat-*
 white-LE-wave-Infl
 ‘with white waves’

¹For a discussion on zero and overt suffixation, see Lieber (1980: Ch. 3).

ol-o-xomat-os *xoma-* ~ *xomat-*

full-LE-dust-Infl

‘full of dust’

mavr-o-pismat-os *pisma-* ~ *pismat-*

black-LE-stubbornness-Infl

‘very stubborn’

Observe that in these compounds the second stem appears in an allomorphic form. By way of example, in the Cypriot *oloxómatos*, the lexeme *xóma* ‘dust, soil’ appears in the allomorph *xomat-*. Of importance to our discussion is that the distribution of allomorphs is process sensitive (Ralli, 2005, 2006a). That is, *xomat-* appears in Inflection (13a) and Derivation (13b):

- (13) a. *xomat-os* *xomat-a* *xomat-on*
 dust-Neut.SG.GEN dust-Neut.PL.NOM/ACC dust-Neut.PL.GEN
- b. *xomat-in-os*
 dust-Dsuf-Infl
 ‘made of dust/soil’

Consider now endocentric compounds headed by *xoma*:

- (14) a. *amm-o-xom-a* < *amm(os) xom(a)*
 sand-LE-soil-Infl sand dust, soil
 ‘soil containing sand’
- b. *kokkin-o-xom-a* < *kokkin(o) xom(a)*
 red-LE-soil-Infl red dust, soil
 ‘redish soil’

Of major importance to our discussion is the fact that the allomorphic behaviour which is manifested by the exocentric *ol-o-xomat-os* does not appear in the endocentric *kokkin-o-xom-a* and *amm-o-xom-a* which are headed by *xóma* ‘dust, soil’.

The presence of allomorphy in the compounds in (12) can only be explained if we assume that there is a zero-affix which triggers this allomorphic behaviour. That is, *oloxómatos* should be attributed the structure in (15):

- (15) *ol-o-xomat-ø-os* *xoma-* ~ *xomat-*
 full-LE-dust-Dsuf-Infl
 ‘full of dust’

To generalize over these observations, it seems safe to suggest that Greek exocentric compounds involve both compounding and derivation. Exocentric bahuvrihis from previous evolutionary stages exhibit two stems plus an affix, *-i(os)* in *hom-o-patr-i-os* ‘same-LE-father-Dsuf-Infl’, *-ai(os)* in *eikosa-mn-ai-os* ‘twenty-LE-mina-Dsuf-Infl’, and *-at(os)* in *anikt-o-kutal-at-os* ‘broad-LE-shoulder-Dsuf-Infl’. In addition, the existence of several alternating forms of exocentric compounds, one with an overt suffix and another with a covert suffix, corroborates the proposal that compounds such as the Cypriot *adr-o-mutsun-ø-os* ‘coarse-LE-face-Dsuf-Infl’ should be accounted for by zero-derivation. Minimal pairs of bahuvrihi compounds with and without an overt suffix are present in all evolutionary stages of the Greek language. As I will show in the following sections, minimal pairs of exocentric formations with and without an overt suffix are present in other types of exocentric compounds as well.

8.2.2 Derivation in other languages

The relation between derivation and compounding is also evident in exocentric compounds from languages other than Greek. Dutch, for example, exhibits the derivational suffix *-ig*. Consider the following from Booij (2005a: 128-129):

- (16) *kort-adem-ig* ‘short of breath’
lang-ben-ig ‘long-legged’
twee-lettergrep-ig ‘disyllabic’
blauw-og-ig ‘blue-eyed’
lang-har-ig ‘long-haired’

Olsen (2002: 245) also provides examples of Armenian bahuvrihi compounds which bear an overt suffix, namely *-i*. Consider the following examples:

- (17) *meca-gn-i* ‘high-priced’ (~ *gin* ‘price’)

mia-stn-i ‘one-breasted’ (~ *stin* ‘breast’)

miakan-i ‘one-eyed’ (~ *akn/akan* ‘eye’)

Let us now turn to the analysis of bahuvrihi compounds in Slavic languages which can greatly inform our discussion. Consider the word *blue-eyed* in these languages (from Melloni and Bisetto, 2010):

(18) Cz. *modrook-y* ‘blue-eyed’

Rus. *goluboglaz-yj* ‘blue-eyed’

Pol. *niebieskook-i* ‘blue-eyed’

Bul. *blakitnavok-i* ‘blue-eyed’

Of importance to our discussion is that these formations show the following pattern [A N -Infl_A]_A. Observe that although they consist of an adjective and a noun which appears at head position, they, nevertheless, take an adjectival inflectional suffix. That is, these formations do not take the inflectional suffix of the right-most constituent which is a noun.

Melloni and Bisetto (2010) also argue that other formations such as *kratk-o-vrem-enn-yj* ‘short in time’, exhibit an overt derivational suffix. Consider the following from Russian (adapted from Melloni and Bisetto, 2010: 209):

(19) *kratk-o-vrem-enn-yj* ‘short-LE-time-Dsuf-Infl’

‘short (in time)’

mal-o-ljud-n-yj ‘few-LE-people-Dsuf-Infl’

‘scarcely populated’

Based on the presence of formations such as *kratkovremennyj* in (19) with an overt suffix, Melloni and Bisetto (2010) argue that bahuvrihi compounds in Slavic such as the ones in (18) should be dealt with by zero-derivation. By way of example, the Russian *belogolovyj* ‘white-headed’ should be attributed the same structure as *kratkovremennyj* in (19). The only difference between the two is that the suffix which turns the formation into an adjective and which is responsible for the adjectival inflectional suffix is overtly expressed in *kratkovremennyj* but it is a zero-suffix in *belogolovyj*. This is in accordance

with our analysis of adjectival bahuvrihis in Greek and the proposal that this type of compounding involves derivation (overt or zero).

8.3 Order of application

The analysis of Greek adjectival bahuvrihi compounds in the previous sections seems to suggest that the relation between compounding and derivation is manifested in these formations in an interesting way since bahuvrihis involve two stems plus a derivational suffix (overt or zero).

(20) [stem1 stem2 -Dsuf -Infl]

The purpose of this section is to enquire into the order of application of compounding and derivation in Greek adjectival bahuvrihis. More specifically, it aims to uncover whether these formations follow the structural pattern depicted in (21a) or (21b):

(21) a. [stem1 [stem2 Dsuf]]

b. [[stem1 stem2] Dsuf]

In (21a), derivation precedes compounding, in that, stem2 first combines with the derivational suffix and, then, the suffixed stem, i.e. [stem2 Dsuf], combines with stem1, i.e. [stem1 [stem2 Dsuf]]. In (21b), however, derivation follows compounding. Observe that the first step involves the combination of stem1 and stem2. The new stem which is the result of composition, i.e. [stem1 stem2], undergoes suffixation, i.e. [[stem1 stem2] Dsuf].

It should be noted that the question of the order of application of compounding and derivation has also been raised with respect to (verbal) synthetic compounds which consist of a noun and a deverbal element (Lieber, 1983, 1992; Booij, 1988; Ackema and Neeleman, 2004; Ralli, 2013). Consider the following schemata for *bus driver*:

(22) a. [bus [drive -er]]

b. [[bus drive] -er]

The structure in (22a) shows that *bus driver* is a compound of the [N N] pattern, whereas, based on (22b), the [N V] compound *bus drive* undergoes suffixation with *-er*.

In the present thesis, I will assume along with various others (Ralli, 1992, 2009b, 2010, 2013; Lieber, 2004, 2009) that compounds of the type *bus driver* follow the schema in (22a). Ralli (2010: 66), for instance, argues that the Greek *nixokóptis* ‘nail-clipper’ is based on the structure (22a) and not (22b):

- (23) a. [nix- [kop -tis]]
 b. [[nix- kop-] -tis]

A basic argument in favour of the idea that synthetic compounds are based on the combination of a noun and a deverbal noun is that, in most cases, the assumed verbal base, i.e. [N V], is not attested. By way of example, the compound *bus drive* on which *bus driver* would be based, is not attested. Similarly, *nixokóvo* ‘to nail-cut’ is not attested either.

8.3.1 Bahuvrihis as bracketing paradoxes

In this section, I analyze adjectival bahuvrihis and delve more deeply into the order of application between compounding and derivation. This analysis can inform the discussion on *bracketing paradoxes* since there seems to be an inconsistency between the structure suggested by the morpho-phonological properties and the structure suggested by the meaning of these formations.

Consider, for example, the English *blue-eyed*. The morphological make-up of this formation seems to suggest that it is an [A A] compound which consists of the adjective *blue* and the possible but not attested word *eyed* (24a). On the contrary, the semantics of *blue-eyed* ‘one with blue eyes’ suggests that the correct structure is the one in which the affix *-ed* attaches to a compound, namely *blue-eye* (24b):

- (24) a. [blue [eye -ed]]
 b. [[blue eye] -ed]

Issues involving bracketing paradoxes have been hotly debated and no consensus has been reached; scholars such as Booij (2005a) and Lieber (2010a) argue that (24a) is correct, whereas ten Hacken (2000) and Plag (2003) argue in favour of structure (24b).

Let us first consider the analysis of the Dutch compound *blauwogig* ‘blue-eyed’ offered by Booij (2005a: 129). In Dutch, neither the compound *blaw-oog* nor the derived

og-ig are attested words. Booij argues that although *ogig* is not attested, it is, nevertheless, a possible word and he further claims that this possible word serves as the head of the compound *blauwogig*. In order to account for the non-occurrence of the Dutch *ogig* and the English *eyed*, Booij (2007: 59) claims that this can be explained by the pragmatic *Non-redundancy constraint* (Ackerman and Goldberg, 1996; Goldberg and Ackerman, 2001). That is, human beings have eyes and it is, therefore, redundant to create an affixed word which would denote ‘one who has eyes’, i.e. *eyed*.

Another important aspect of Booij’s analysis is that he bases his analysis on the *conflation*² of two independent schemata, namely the schema for [A A] compounds and the schema for denominal adjectives in *-ig*.³

(25) [A A]_A [N-ig]_A

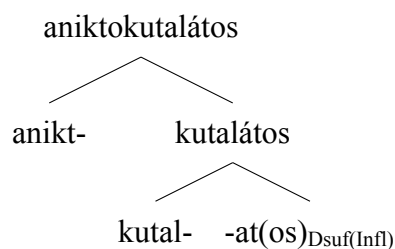
Contrary to Booij’s analysis, ten Hacken (2000: 357) argues that *blue-eyed* should be based on the structure in (24b) because even when the second constituent exists, it has a meaning which is not part of the meaning of the compound. By way of example, the formation *roodharig* ‘red-haired’ has *harig* as a second constituent. Crucially, when *-ig* is attached to the noun *haar*, the meaning of the derived *harig* is ‘having a lot of hair’. The formation *roodharig*, however, does not mean ‘one who has a lot of red hair’ and this is used by ten Hacken as evidence against the proposal that compounds such as *blue-eyed* are based on the structure [A A].

In the rest of this section I focus on the analysis of Greek bahuvrihi formations. The issue to be tackled is whether a compound such as the Cypriot *aniktokutalátos* ‘broad-shouldered’ should be attributed the structure in (26a) or the one in (26b). It should be noted that neither the compound *aniktokutal-* ‘broad-shoulder’ nor the derived word *kutalatos* ‘shouldered’ are attested in Cypriot although both are of course possible:

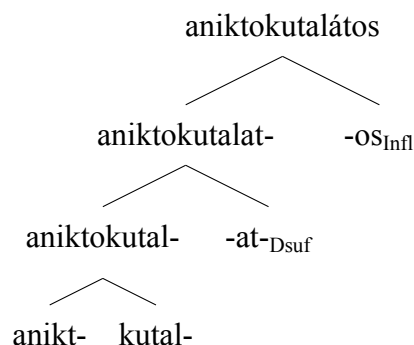
²According to Booij (2005a: 127) *conflation* denotes the unification of two schemas for complex words.

³To the best of my knowledge, proponents of the idea that a compound such as *blue-eyed* is based on the pattern [A [N-ed]] do not offer arguments against the proposal that these formations should be attributed the structure [[A N] -ed]. Booij, for instance, argues that the Dutch *blauwogig* is based on the conflation of the schema for [A A] compounds and the schema for denominal adjectives in *-ig* but he does not comment on the possibility that this compound could be attributed a different structure.

(26) a.



b.



To begin with, let us examine the semantics of bahuvrihi formations; (27a) corresponds to the structure in (26a) and (27b) to the schema in (26b):

- (27) a. [-dynamic, scalar ([_i])] [-dynamic, scalar ([_i], [+material ([_i]))]
anikt- ‘broad’ *-atos* *kutal-* ‘broad’
- b. [-dynamic, scalar ([_i], [-dynamic, scalar ([_i])] [+material ([_i]))]
-atos *anikt-* ‘broad’ *kutal-* ‘broad’

As is well known, bahuvrihis denote one who has a Noun modified by the adjective. In this particular case, *aniktokutalátos* denotes one ‘who has broad (adjective) shoulders (noun)’.

Based on the semantic representation in (27a), *aniktokutalátos* is a formation composed of two adjectives, *anikt-* and *kutalatos* respectively. Observe that the derivation of *kutalatos* ‘shouldered’ involves the co-indexation of the highest argument of the non-head, which is the noun *kutal-* ‘shoulder’, with the only argument of the head, which in this particular case is the affix *-atos*. The second step involves the combination of *kutalatos* and *anikt-* which modifies the former. If we assume that *aniktokutalátos* is based on the representation in (27a), we cannot derive the meaning ‘who has broad-shoulders’ for the following reason: the adjective in this case would modify the adjectival *kutalatos* ‘shouldered’ and the meaning of the structure would be ‘a shouldered person who

is broad'. On the contrary, the meaning of *aniktokutalátos* shows that the adjective *anikt-* 'broad' has scope over the noun *kutal-* and not over the assumed *kutalatos*.

Let us now turn to the representation in (27b). As illustrated in (27b), the first step involves the composition of the two stems, *anikt-* and *kutal-* into a combination with the meaning 'broad shoulder'. The second step includes subordination of the combination *aniktokutal-* by the suffix *-atos*. That is, *aniktokutalátos* is not an [A A] compound as depicted in (27a), but an attributive compound of the structure [A N] which undergoes derivation. The representation in (27b) can derive the correct meaning, that is, 'one who has broad-shoulders', since in this case the adjective *anikt-* has scope over the noun *kutal-* and, at the same time, the suffix *-atos* subordinates the whole structure and not only the noun *kutal-*. As a result, the structural pattern for *aniktokutalátos* is the following:

(28) [[A N]_N -Dsuf_A]_A

Another argument in favour of the proposal that in these formations derivation follows compounding, comes from the existence of a small number of bahuvrihi compounds with an attested nominal base. Although the bulk of exocentric compounds has no attested base, the formations in (29) which show the relation between bahuvrihis and root compounds can greatly inform our discussion:

(29) *argir-o-petal-o* 'silver-plating' > *argir-o-petal-at-os* 'with silver plating'
 silver-LE-plating-N.Neut silver-LE-plating-Dsuf-A.M

agi-o-frid-o 'saint-like eyebrows' > *agi-o-frid-ø-os* 'with saint-like eyebrows'
 saint-LE-eyebrow-N.Neut saint-LE-eyebrow-Dsuf-A.M

argir-alisid-o 'silver-chains' > *argir-alisid-at-os* 'tied with silver chains'
 silver-chain-N.Neut silver-chain-Dsuf-A.M

void-o-mat-i 'ox-eye' > *void-o-mat-i-s* 'with big eyes'
 ox-LE-eye-N.Neut ox-LE-eye-Dsuf-A.M

gatt-o-kefal-o 'cat-head' > *gatt-o-kefal-ø-os* 'whose head is like a cat-head'
 cat-LE-head-N.Neut cat-LE-head-Dsuf-A.M

These formations indicate that bahuvrihi compounds may be based on nominal compounds which undergo suffixation. One could, therefore, assume that even if the nominal base is not attested in most cases, it is, nevertheless, a possible formation. Just like *argiropetalátos* ‘decorated with silver plating’ is formed on the attested *argiropétalo* ‘silver plating’, *aniktokutalátos* ‘broad-shouldered’ is based on the possible nominal compound *aniktokutála* ‘broad-shoulder’.

A third argument in favour of the idea that *aniktokutalátos* is based on the schema [[[stem1 stem2] -Dsuf] -Infl] comes from formations whose second member is neither an attested nor a possible word. A crucial point in the analysis of Booij is that two independently attested patterns conflate in order to create a compound such as *blue-eyed*. This analysis could be extended to *aniktokutalátos* as well, since *kutalatos* is a possible word and, in addition, the schemata [A A] and [N -atos] are independently attested in Cypriot. This analysis, however, cannot be extended to other bahuvrihis. Consider, for example, the minimal pair *aniktokutalátos/aniktokútalos* which I repeat in (30):

- (30) *anikt-o-kutal-at-os* *anikt-o-kutal-ø-os*
 broad-LE-shoulder-Dsuf-Infl broad-LE-shoulder-Dsuf-Infl
 ‘with broad shoulders’

These formations have the same semantics and function, their only difference being that the former has an overt suffix, i.e. *-atos*, whereas in the latter the suffix is covert, i.e. zero. The proposal that these formations are [A A] compounds is not accurate simply because **kutralos* ‘shouldered’ in *aniktokútalos* is neither an attested nor a possible word in Cypriot. That is, there is no structural pattern on which **kutralos* could be based.

This line of argument can also be extended to bahuvrihi compounds which exhibit the suffix *-i*. In the compound *katsar-o-mall-i-s* ‘curly-LE-hair-Dsuf-Infl’, for instance, the assumed **mallis* is neither attested nor possible as a word in Cypriot. As a result, it cannot be maintained that Greek bahuvrihis are [A A] compounds. On the contrary, *aniktokútalos* ‘broad-shouldered’, *asprokéfalo* ‘white-haired’, and *katsaromállis* ‘curly-haired’ are attributive compounds which undergo derivation.

To sum up, Greek exocentric compounds involve compounding and derivation, in that, they involve two stems plus an affix. More specifically, as argued for in the present section, Greek exocentric compounds are formed by the suffixation of a nominal base

which is the result of the combination of two stems. To generalize over these observations, a Greek exocentric compound is based on the schema in (31):

(31) [[[stem1 stem2]_{STEM-Dsuf}]_{STEM-Infl}]_{WORD}

Greek exocentric compounds seem to be created on the basis of the structural pattern depicted in (31), where suffixal derivation follows compounding, i.e. the combination of two stems, derivation is realized by a suffix (overt or zero), and inflection marks the edge of the word.

8.4 More on the structure of exocentric compounds

In the previous section, I claimed that Greek exocentric compounds are based on a structural pattern which involves both derivation and compounding. In this section, I test whether this pattern can account for other types of compounds which have been labeled exocentric in literature. In Section 8.4.1, I analyze Homeric prepositional compounds and in Section 8.4.2, I turn to verb-first formations.

8.4.1 Homeric prepositional compounds as exocentric formations

Prepositional compounds fail the hyponymy test since in these compounds there is no hyponymic relation between the compound as a whole and its constituents. The formation in (32), for example, consists of the preposition *agchi* ‘near’ and the noun *theos* ‘god’, but the compound as a whole denotes neither a ‘kind of’ *god* nor a ‘type of’ *near*. On the contrary, *agchi-theos* denotes ‘one who is near the gods’.

(32) *agchi-theos* < *agchi theos*
 ‘who is near the gods’ near god

The exocentricity of prepositional compounds is of the same type as the exocentricity exhibited by bahuvrihi compounds. Kastovsky (2009: 338) comments on the similarity between prepositional and bahuvrihi compounds: “[Prepositional compounds] are similar to the bahuvrihis in that they represent a phrase which describes a characteristic feature of the head outside the phrase, except that in this case the phrase denotes a locative relation represented by a preposition and a noun, and not a property represented by

an Adj/N + N structure”. As I will show in this section, the similarity between bahuvrihi and prepositional compounds is also evident in the structure of these formations since both are based on the same structural pattern.

First, like bahuvrihis, prepositional compounds can be formed by overt suffixation. Consider the following formations:

- (33) *ein-al-i-os* < *en al(s)*
 in-sea-Dsuf-Infl in, on sea
 ‘in, on, of the sea’
- ep-ouran-i-os* < *epi ouran(os)*
 on-heaven-Dsuf-Infl on sky, heaven
 ‘heavenly’
- meta-de:m-i-os* < *meta de:m(os)*
 among-people-Dsuf-Infl among people
 ‘among the people’

Observe that these formations exhibit the suffix *-i-* which we identified in bahuvrihis such as *hom-o-patr-i-os* ‘same-LE-father-Dsuf-Infl, having the same father’. The only difference is that in prepositional compounds, the first element is a preposition and not an adjective or a noun as in bahuvrihis.

The analysis of prepositional compounds corroborates the proposal that, in Greek exocentric compounds, the suffix which serves as the head of the word may be overt or zero. Consider the following minimal pairs of prepositional compounds with and without overt suffixation:

- (34) *eph-al-i-os* *eph-al-∅-os*
 on-sea-Dsuf-Infl on-sea-Dsuf-Infl
 ‘on the sea’
- en-upn-i-os* *en-upn-∅-os*
 in-sleep-Dsuf-Infl in-sleep-Dsuf-Infl
 ‘(appearing) in sleep’
- eph-e:mer-i-os* *eph-e:mer-∅-os*
 on-day-Dsuf-Infl on-day-Dsuf-Infl
 ‘on, for a day’

Observe that in these pairs, the first formation exhibits the suffix *-i-*, whereas in the second formation, the suffix is zero. The prepositional *eph-e:mer-i-os*, for example, is composed of the preposition *epi*, the stem form of the noun *he:mera* the adjectival derivational suffix *-i-*, and the inflectional suffix *-os*. The formation *eph-e:mer-ø-os*, however, which has the same meaning as *eph-e:mer-i-os*, does not show an overt suffix. The suffix is, therefore, zero in this formation. This is in accordance with the analysis of other minimal pairs of bahuvrihis which we identified in the previous sections.

Let us now turn to the examination of the order of application of the morphological processes. In particular, in what follows, I comment on whether these formations have the structure illustrated in (35a) or (35b):

- (35) a. [[Prep. Noun] -Dsuf]
 b. [Prep. [Noun -Dsuf]]

According to (35a), prepositional compounds are created by suffixation of a derivational suffix to a base composed of a preposition and a noun. According to the schema in (35b), however, prepositional compounds are based on the structure [Prep. Adj.], that is, the first step involves the creation of an adjective which results from the suffixation of an adjectival suffix to a nominal base.

A first argument in favour of structure (35a) is that there is a relation between these formations and syntactic phrases. Based on the condensation hypothesis, historically, such compounds originate from syntactic phrases in which the preposition governs the noun as in *ein-al-i-os* ‘in-sea-Dsuf-Infl’ which corresponds to the phrase *en ali* (in sea.DAT) ‘(who is) in the sea’. As a result, the development of these formations can be used as a strong argument in favour of the schema in (35a).

A number of prepositional compounds seem to be based on the structural pattern illustrated in (35b) since they involve a constituent which (at least phonologically) corresponds to an attested word. As a result, these formations are cases par excellence for the study of *bracketing paradoxes*. Consider for example the formations *ex-ais-i-os* and *hup-ouran-i-os*:

- (36) *ex-ais-i-os* < *ek ais(a)*
 out-fate-Dsuf-Infl out fate, destiny
 ‘beyond what is ordained or fated, portentous’

hup-ouran-i-os < *hupo ouran(os)*
 under-sky-Dsuf-Infl under sky
 ‘under heaven, under the sky’

In these formations, both *ais-i-os* and *ouran-i-os* are attested as independent words. Although the occurrence of these words seems to indicate that the formations in (36) are based on the structure [Prep. [N -Dsuf]], a closer inspection shows that this is not accurate since the meaning of these words is not part of the meaning of the formations in (36).

The word *ouran-i-os* has the general meaning ‘in or of heaven’ and its more specific meaning is ‘heavenly, dwelling in heaven’. The meaning of the formation *hup-ouran-i-os* ‘who is under the sky’, however, is not related with either the generic or the specific meaning of *ouran-i-os*. We, therefore, have to assume that the prepositional compound *hup-ouran-i-os* is a bracketing paradox in which derivation follows the combination of the preposition with the noun as depicted in structure (35a).

The question whether *ex-ais-i-os* has the word *ais-i-os* as a second constituent has been commented on by Tserepis (1902). In his analysis, Tserepis shows that it is not accurate to propose that this formation is based on the structure [Prep. Adj.], i.e. *ex-aisios*, because this structure cannot derive the meaning ‘portentous’. First, the independent word *ais-i-os* has the meaning ‘auspicious, opportune, right’. Second, as shown by the examples in (37), in the structure [*ek* + A], the preposition acts as an intensifier of the meaning of the adjective:

- (37) *ek-pikros* ‘very bitter’
 out-bitter_A
- ek-leukos* ‘quite white’
 out-white_A

The word *ek-pikros*, for example, which is based on the structure [PreP. Adj.], has the meaning ‘very bitter’. In a similar vein, *ek-leukos* means ‘quite white’. The formation *ex-aisios*, however, does not denote ‘one who is very auspicious, opportune or right’. On the contrary, it has the exact opposite meaning, i.e. ‘one who is portentous’. As a result, prepositional compounds, even those which have a second constituent which is

phonologically identical to an independent word, are based on the structure [[Prep. N] -Dsuf].

The meaning of a prepositional compound such as *hup-ouran-ios*, dictates the following lexical-semantic representation:

- (38) [-dynamic, scalar ([_j], [+Loc, ([_j], [_i], [+material ([_i]))]]]
 -*ios* *hupo* ‘under’ *ouranos* ‘sky’

The representation in (38) aims to capture the fact that the word *hup-ouran-ios* has the meaning ‘under the sky’. In more detail, the preposition *hupo* ‘under’ should be attributed the skeleton in (39) since it shows Location:

- (39) [+Loc, ([], [])]

Observe that this preposition has two arguments. The first argument corresponds to the thing located or *theme* and the second argument is the complement of the preposition or *relatum* (Bierwisch, 1996; Lieber, 2004). In this particular case, *ouranos* ‘sky’ is the *relatum* and the *theme* is expressed by the suffix.

The conceptual structure in (38) derives the correct meaning since the “R” argument of *ouranos* ‘sky’ is co-indexed with the *relatum* argument of the preposition. This gives us the structure *hup-ouran-* which undergoes derivation. That is, the suffix *-ios* subordinates the skeleton of *hup-ouran-* and its only argument is co-indexed with the *theme* argument of the preposition. This derives the meaning ‘who is under the sky’.

The analysis of prepositional compounds corroborates the idea that exocentricity in Greek is related with the co-occurrence of compounding and derivation. More specifically, these formations can be accounted for by the structural pattern in (40) according to which, exocentric compounds in Greek involve the combination of two stems (or a word and a stem) into a new stem which undergoes derivation.

- (40) [[[stem/word1 stem2]_{STEM}-Dsuf]_{STEM}-Infl]_{WORD}

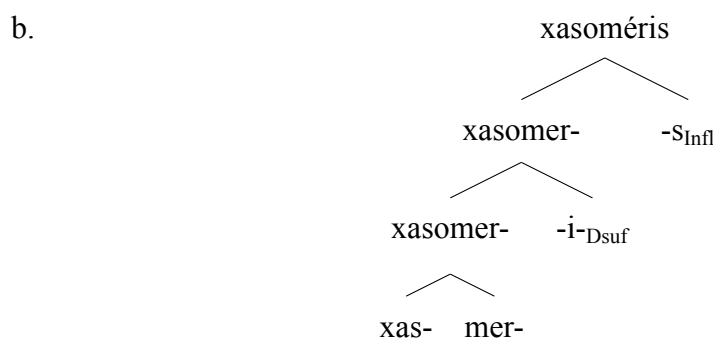
This pattern has also been identified with respect to adjectival bahuvrihi compounds and it is characteristic of Greek compounds which have been labeled *exocentric*.

8.4.2 Verb-first compounds

Verb-first compounds are considered to be exocentric in a number of languages. As argued for in Chapter 7, the English compound *pick-pocket* is considered exocentric because in this formation there is no overt marking corresponding to the external argument of the verb.

Greek compounds which have a verb as a first constituent are also treated as exocentric by Ralli (2005, 2007, 2013). Ralli argues that a compound such as *xasoméris* in (41a) has the structure in (41b):

- (41) a. *xas-o-mer-i-s* < *xan(o) mer(a)*
 lose-LE-day-Dsuf-Infl lose day
 ‘loafer’



Based on her analysis, the compound *xasomer-* ‘lit. to lose day’ which results from the combination of *xas-* ‘lose’ and *mer-* ‘day’ undergoes suffixation with the suffix *-i-*.

A lexical-semantic analysis of Greek verb-first compounds shows that there might be a difference between Greek and English exocentric synthetic compounds. Consider the conceptual structure of *sfoggokolários* ‘who wipes the butt (of the king), Groom of the Stool’ (< *sfogg(o)* ‘wipe’ *kol(os)* ‘butt’):

- (42) [+material, dynamic ([_j], [+dynamic ([[sentient, volitional-j]], [_i]])] [+material ([_i])]
-arios *sfogg-* ‘wipe’ *kol-* ‘butt’

The first step includes the combination of the verb *sfogg-* and the noun *kol-*. Given that the first argument of the verb must be [*sentient, volitional*], the “R” argument of *kol-* co-indexes with the second argument of the verb which corresponds to the internal argument. The second step involves subordination of *sfoggokol-* by the suffix *-arios* the argument of which co-indexes with the external argument of the verb.

As far as the semantics of English verb-first compounds is concerned, we mentioned in the previous chapter that Lieber (2009) argues that the exocentric reading results from the unindexed argument of the verb. Consider, for example, the representation of *pick pocket* which I repeat in (43):

- | | |
|--|--|
| (43) <i>pick</i> | <i>pocket</i> |
| [+dynamic ([_{sentient, volitional}], [_i])] | [+material ([_i])] |
| <manner> | <-animate> |
| | <+artifact> |
| | {contains stuff, an article of clothing,...} |

Observe that despite the fact that there is no overt marking of the agent, the [*sentient, volitional*] argument of *pick* which is unindexed, remains an active argument of the verb.

It seems to me that a problem with the solution proposed by Lieber is that it is not the case that an unlinked argument of the verb results in an exocentric reading of the compound. To be more specific, an unindexed argument, namely the argument which corresponds to the agent, remains unindexed in [N V]_v as well, but this does not result in exocentricity. Consider for instance the Greek verbal compound *xartopézo* ‘to card play’:

- | | |
|-------------------------------------|--|
| (44) [+material ([_i])] | [+dynamic ([_{sentient, volitional}], [_i])] |
| <i>xart-</i> ‘card’ | <i>pezo</i> ‘play’ |

A comparison between the lexical-semantic representation of *xartopézo* and *pick pocket* shows that the external argument of the verb remains unindexed in both cases.⁴ This, nevertheless, does not lead to an exocentric agentive reading in the case of *xartopézo*, since this formation is a verb with the meaning ‘to card-play’ and it does not denote ‘someone who plays cards’.

In my opinion, the meaning of exocentric verbal formations indicates that both arguments of the verb are discharged. In other words, there is no unindexed argument of the verb in either Greek or English verb-first compounds.

As a last remark I would like to add the observation that there are scholars (Marchand, 1969; Kiparsky, 1982) who treat English compounds such as *pick-pocket* as com-

⁴The fact that the verb is on the right in *xartopézo* and on the left in *pick pocket* is not significant since linearization is not relevant to lexical semantics.

binations of a verb and a noun which undergo zero-derivation. If this analysis is correct, we need not assume that there is an unindexed argument in compounds of the *pick-pocket* type since all arguments of *pick* would be discharged as illustrated in the conceptual structure in (45):

- (45) [+material, dynamic ([_j], [+dynamic ([[sentient, volitional-j]], [_i]]) [+material ([_i])]]
 -∅- *pick* *pocket*

On the assumption that *pick-pocket* undergoes zero-derivation, exocentric verbal compounds in English and Greek could be accounted for by the schema in (46):

- (46) [[[stem/word1 stem2]_{STEM-Dsuf}]_{STEM-Infl}]_{WORD}

This pattern seems well motivated for Greek data since several verb-first exocentric compounds exhibit a derivational suffix. As far as English is concerned, the choice between the analysis of Lieber (2004) and other scholars (Marchand, 1969; Kiparsky, 1982) largely depends on one's stance toward zero-derivation, although the semantics of these formations seems to suggest that both arguments of the verb are discharged.

8.5 Endocentric and exocentric schemata

The foregoing discussion suggests that exocentricity might be an epiphenomenon, reflecting a particular order of application of compounding and derivation. That is, when compounding and derivation co-occur within the same morphologically complex item, compounding precedes derivation. It follows from this concept of exocentricity that a structure is endocentric if it contains only compounding, or involves derivation and compounding, in this particular order. The presentation of the various structural patterns on which Greek compounds are built will allow us to test this generalization.

The work of Ralli (2005, 2007, 2009b, 2013) reveals that Greek compounds are based on four structural patterns:

- (a) [word-word]
- (b) [stem-word]
- (c) [word-stem]

(d) [stem-stem]

The main criteria for such a division are the form of the inflectional ending and the position of stress: while [stem/word word] constructions have the same inflection and the same stress position as their second (word) constituent, [stem/word stem] compounds usually have a different inflectional ending and another stress position from those of the second member, when the latter occurs as an independent word. With respect to the position of stresses, [stem/word stem] compounds are subject to a compound-specific stress rule which assigns stress to the antepenultimate syllable, whereas [stem/word word] compounds preserve the stress of their right-most constituent which is a fully inflected word.

Let us first comment on compounds with a word as a second constituent. The formation *ksanakáno* in (47) illustrates the type of [word word] compounds in Greek:

- (47) a. *ksana-kan-o* < *ksana kan(o)* SMG
 again-do-Infl again do
 ‘to do again’
- b.
- ```

 ksanakáno
 / \
 ksana káno

```

In this pattern of compounding, the first element is always uninflected, i.e. an element which does not inflect. In this particular compound, it is the adverb *ksaná* ‘again’ which combines with the fully inflected word *káno* ‘to do’. This is an endocentric compound since it only involves the composition of a word and a stem.

The Cypriot *arkokapnós* in (48) illustrates the [stem word] structural pattern:

- (48) a. *ark-o-kapn-os*            < *ark(os) kapn(os)* Cypriot  
 wild-LE-tobacco-Infl    wild    tobacco  
 ‘wild-tobacco’
- b.
- ```

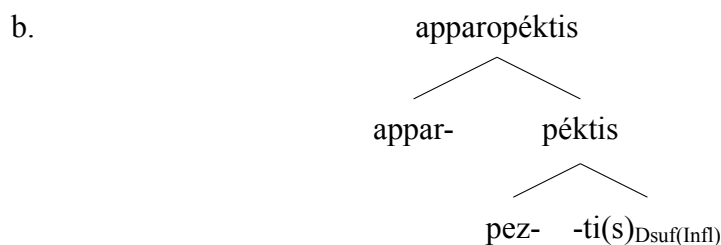
      arkokapnós
     /      \
   ark-   kapnós
  
```

The structure in (48b) shows that the adjective *ark(os)* ‘wild’ which appears in its stem form, *ark-*, combines with the fully inflected word *kapnós* ‘tobacco’. This is also an

endocentric compound since compounds which are based on this pattern are formed by the composition of a stem and a word. The question of exocentricity is not relevant to these formations since these compounds do not involve derivation.

The [stem word] pattern also includes compounds the second member of which is a derived word. Consider the compound *apparopéktis* in (49):

- (49) a. *appar-o-pek-ti-s* < *appar(os) pekti(s)* Cypriot
 horse-LE-play-Dsuf-Infl horse player
 ‘gambler in horseraces’



Based on the schema in (49b), the compound *apparopéktis* is a [N N] formation which consists of the stem *appar-* ‘horse’ and the word *péktis* ‘player’ which derives from the verb *pézo* ‘to play’. The structure of this compound is important to the distinction between endocentric and exocentric compounds since *apparopéktis* involves both derivation and compounding. Given that in this compound derivation precedes compounding, that is, the first step includes the derivation of *péktis*, *apparopéktis* is considered endocentric.

Let us now consider compounds the second member of which is a stem, namely [word stem] and [stem stem] compounds. Like [word word] compounds, the [word stem] pattern includes compounds the first element of which is an uninflected word. The compound *panoxóri* in (50), for example, is composed of the word *páno* ‘upper’, the stem *xor-* ‘village’, and the inflectional suffix *-i*:

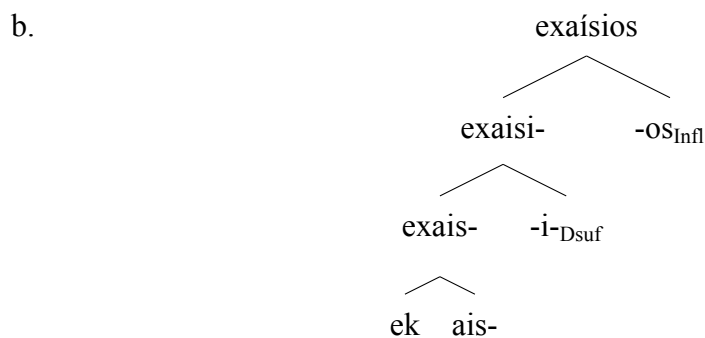
- (50) a. *pano-xor-i* < *pano xor(io)* SMG
 upper-village-Infl upper village
 ‘upper village’



Observe that both the stress and the inflectional suffix of *panoxóri* differ from the position of stress and the form of the inflectional suffix of *xorió* ‘village’ when the latter is used as an independent word. This is an endocentric compound since it does not involve derivation.

The exocentric counterpart of this pattern includes compounds of the structure [word stem] which undergo derivation. This type is illustrated by Homeric prepositional compounds. The compound *ex-aisios*, for instance, has the structure in (51b):

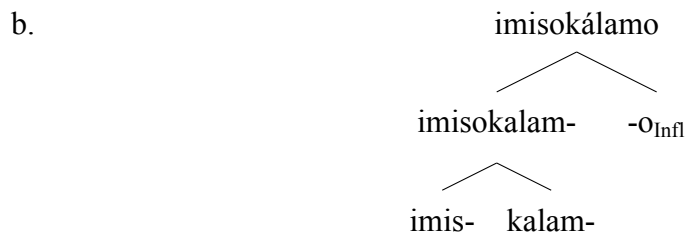
- (51) a. *ex-ais-i-os* < *ek aisa*
 out-fate-Dsuf-Infl out fate, destiny
 ‘beyond what is ordained or fated, portentous’



As argued for in Section 8.4.1, derivation in prepositional compounds follows the combination of the preposition with the noun. As a result of this particular order of application of compounding and derivation, prepositional compounds are rendered exocentric.

The [stem stem] structural pattern is the most productive way to build a Greek compound. The word *imisokálamó* in (52) from the dialects of Southern Italy illustrates this pattern:

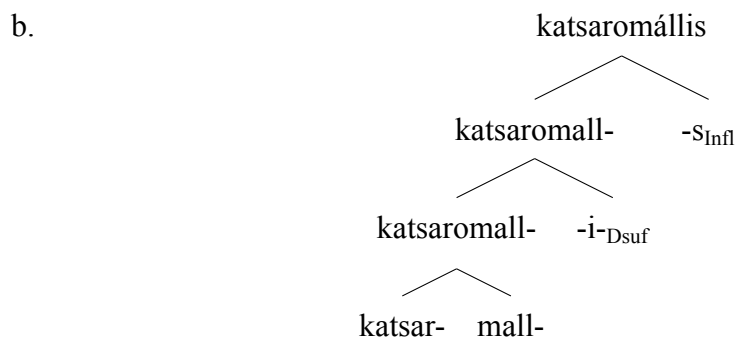
- (52) a. *imis-o-kalam-o* < *imis(o) kalam(i)* Italiot
 half-LE-reed-Infl half reed
 ‘half reed’



This compound is composed of *imis-* ‘half’, *kalam-* ‘reed’, and the inflectional suffix *-o*. This formation is of the [stem stem] pattern since its second constituent, i.e. *kalámi*, appears in its stem form *kalam-*; *imisokálam-o* inflects according to IC5 and its stress appears on the antepenultimate syllable, whereas *kalámi* belongs to IC6 and it is stressed on the penultimate syllable. Based on (52b), *imisokálam-o* is an endocentric compound which is composed of two stems, *imis-* and *kalam-*. Given that there is no derivational suffix (overt or zero) in this compound, the question of exocentricity does not arise.

The bulk of Greek exocentric compounds belongs to the [stem stem] pattern as Ralli (2013) has pointed out. Consider the Cypriot *katsaromállis* ‘curly-haired’:

- (53) a. *katsar-o-mall-i-s* < *katsar(o) mall(i)* Cypriot
 curly-LE-hair-Dsuf-Infl curly hair
 ‘with curly hair’

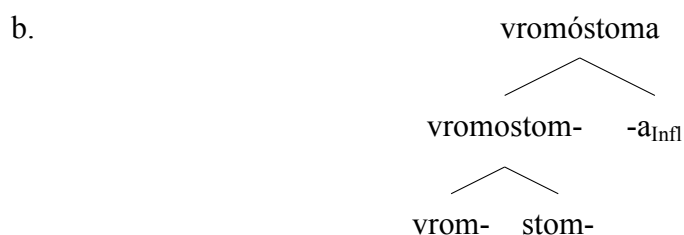


This compound is classified as exocentric since contrary to the endocentric *imisokálam-o* in (52), *katsaromállis* involves derivation which follows the composition of the stems *katsar-* and *mall-*.

A comparison between the compounds *vromóstoma* and *vromóstomos* (< *vrom(iko)* ‘filthy’ *stom(a)* ‘mouth’) shows the distinction between the analysis of bahuvrihis via

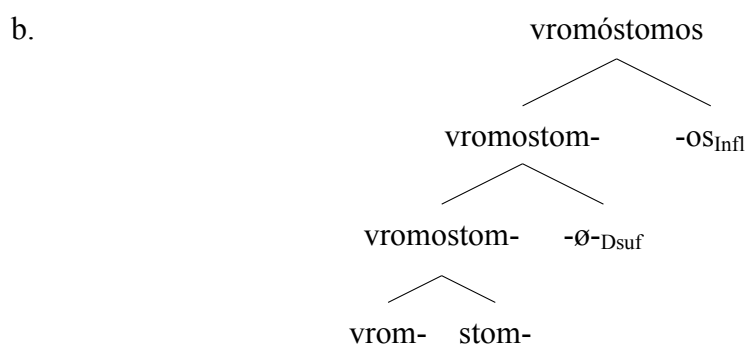
metonymy and derivation. As mentioned in the previous chapter, *vromóstoma* is an endocentric compound which can be used metonymically to denote ‘one who has a filthy mouth’. As such, it is an endocentric compound with the following structure:

- (54) a. *vrom-o-stom-a* < *vrom(iko) stom(a)* HDMG: s.v. *βρωμόστομα*
 filthy-LE-mouth-Infl filthy mouth
 ‘who has a filthy mouth’



The exocentric *vromóstomos*, however, is based on a different structure since contrary to *vromóstoma*, *vromóstomos* involves both compounding and derivation as illustrated in (55):

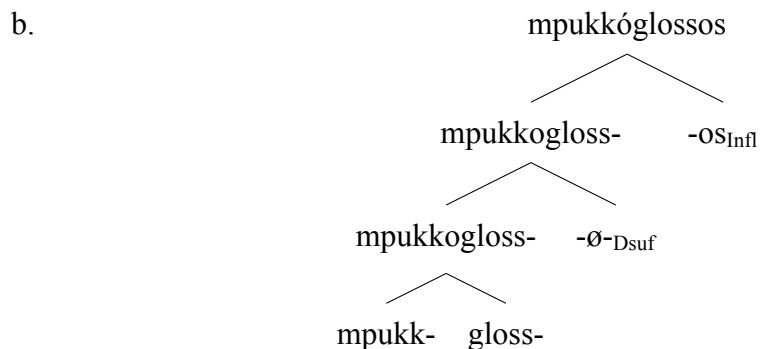
- (55) a. *vrom-o-stom-ø-os* < *vrom(iko) stom(a)* HDMG: s.v. *βρωμόστωμος*
 filthy-LE-mouth-Dsuf-Infl filthy mouth
 ‘who has a filthy mouth’



Although *vromóstoma* and *vromóstomos* can be used with the meaning ‘who has a filthy mouth’, they differ with respect to their structure. The nominal *vromóstoma* is an endocentric [stem stem] compound, whereas the adjectival *vromóstomos* is an exocentric compound. That is, like *vromóstoma*, *vromóstomos* is based on the pattern [stem stem] but, contrary to *vromóstoma*, it undergoes derivation.

Verb-first compounds are also based on the [stem stem] pattern as illustrated by the formation *mpukkóglosos* in (56):

- (56) a. *mpukk-o-gloss-ø-os* < *mpukk(onno) gloss(a)* Cypriot
 have_a_bite-LE-tongue-Dsuf-Infl to have a bite tongue
 ‘who speaks as if his mouth was full of food’



This formation is composed of the verb *mpukkónno* and the noun *glóssa*; the verb appears deprived of the derivational suffix *-onno* due to the *bare-stem constraint* (see above). Under the present concept of exocentricity, this formation is exocentric since it involves both compounding and derivation in this particular order, in that, derivation follows compounding.

In (57), I generalize over the above observations (also see Andreou, 2010; Ralli and Andreou, 2012):

- (57) Exocentricity is an epiphenomenon, reflecting a particular order of application of compounding and derivation, according to which when compounding and derivation co-occur within the same morphologically complex item, compounding precedes derivation. In contrast, a structure is endocentric if it contains only compounding, or involves derivation and compounding, in this particular order.

This generalization is strongly supported by Greek data since all types of Greek compounds which have been labeled *exocentric* or *endocentric*, conform to (57). In addition, (57) employs a single criterion, i.e. the order of application between compounding and derivation, in order to capture the distinction between endocentric and exocentric compounds. As a result, we need not employ the rather loose hyponymy test which, as argued in the present thesis, is not without problems. That is, the ‘formal’ definition of the distinction between endo- and exo-centric formations in (57) makes no reference to notions such as lexicalization, non-compositionality, and semantic drift which have been introduced into the discussion with respect to the distinction between ‘headed’ and ‘headless’ formations.

The definition of this distinction as an epiphenomenon of the application of compounding and derivation can also capture the distinction between the analysis of nominal bahuvrihis via metonymy and (zero-)derivation. On the one hand, proponents of the (zero-)derivation hypothesis argue that a nominal bahuvrihi such as *redhead* is an exocentric compound which undergoes (zero-)derivation. On the other hand, scholars who do not accept the (zero-)derivation hypothesis, argue that *redhead* is an endocentric compound which is interpreted metonymically. The definition of endocentric and exocentric compounds defended in the present thesis can capture both analyses. To be more specific, on the assumption that *redhead* undergoes derivation, the structure of this compound is [[red head] - \emptyset]. This is in accordance with (57), since as an exocentric compound, *redhead* involves compounding and derivation in this particular order. On the contrary, if *redhead* is interpreted metonymically, we need not employ derivation. As a result, *redhead* is endocentric since, as predicted by (57), the question of exocentricity does not arise in the absence of derivation.

A comparison between the patterns [stem/word word] and [stem/word stem] shows that only compounds which belong to the latter pattern can be classified as exocentric. A Greek compound the second member of which is a word is always considered endocentric. This follows from that Greek exocentric compounds involve the combination of two stems (or a word and stem) which undergo derivation. In addition, as mentioned above, compounds such as *apparopéktis* ‘gambler in horseraces’ in (49) in which derivation and compounding co-occur, should be classified as endocentric since in these formations derivation precedes compounding.

8.6 Compounding for the purposes of derivation

Bloomfield (1933) in his seminal work argues that compounds are usually distinguished from *de-compounds*, that is, secondary derivatives based on compounds (e.g. *gentlemanly* from *gentleman*). Dressler (2006) also argues that *high-land-er* is a derivation from a compound, but he immediately states that it is difficult to propose a clear-cut distinction between true compounds and true derivatives. The analysis of formations labeled *exocentric compounds* is of importance since the demarcation between this type of compounding and *de-compounds* is often blurred. This section presents a tentative anal-

ysis of this issue since criteria are largely absent and the demarcation of compounds and de-compounds is related with issues pertaining to attested and possible words, *bracketing paradoxes*, and the very definition of compounding as a process.

To begin with, (58) contains formations which are secondary derivatives based on compounds:

- (58) *protogiunitiko* < *Protogiúni -itiko* Italiot
 ‘fruit which matures in June’ First-June Dsuf
- ampelofillénios* < *ampelófillo -enios* Samos
 ‘made of vine-leaves’ vine-leaf Dsuf

The formations in (58) are secondary formations based on endocentric compounds. The Italiot *protogiunitiko* is a derived word based on the compound *Protogiúni*⁵ and, in a similar vein, *ampelofillénios* is a secondary formation based on the endocentric compound *ampelófillo*.

Consider now secondary formations which have an exocentric bahuvrihi compound as base:

- (59) *aniktomatiá* < *aniktómatos -ia* Cypriot
 ‘cleverness’ open-eyed, clever Dsuf
- askimoprosopiá* < *askimoprósopos -ia* Pontic
 ‘having an ugly face, ugly-faceness’ ugly-faced Dsuf
- alafrokefaliá* < *alafrokéfalos -ia* Naxos
 ‘stupidity’ light-headed, stupid Dsuf

The noun *aniktomatiá* ‘cleverness’ is a secondary formation based on the exocentric compound *aniktómatos* ‘lit. open-eyed, clever’. Similarly, the nominal suffix *-ia* attaches to the exocentric *alafrokéfalos* ‘lit. light-headed, stupid’ and *askimoprósopos* ‘ugly-faced’ to derive the nouns *alafrokefaliá* and *askimoprosopiá* respectively. All compounds in (58) and (59) have something in common. That is, they are secondary formations based on attested compounds; the de-compounds in (58) are based on en-

⁵June is called *Protogiúni* ‘lit. first June’ as opposed to *Defterogiúni* ‘lit. second June, i.e. July’.

docentric compounds and the de-compounds in (59) derive from exocentric bahuvrihi compounds.

A question which arises is how we should classify formations which exhibit derivation on possible but non-attested bases. This question is of paramount importance since the bulk of Greek exocentric compounds shows derivation on a non-attested base. For example, there is no *aniktokutála* ‘broad shoulder’ on which *aniktokutalátos* ‘broad-shouldered’ could be based.

8.6.1 Verbal compounds

In what follows, I focus on verbs which derive from complex nominal bases via suffixation of a verbal affix, usually, *-iz(o)*. The analysis of these formations can greatly inform the discussion on the demarcation between true derivatives (de-compounds) and exocentric compounds.

Consider first formations which can be considered true de-compounds. That is, secondary verbal formations which are based on nominal compounds (from the *HDMG*):

- (60) a. *argiroxtenízo* < *argiróxteno -izo*
 ‘brush hair with a silver-comb’ silver-comb Dsuf
argiróxteno < *argir(o) xten(i)*
 ‘silver-comb’ silver comb
- b. *anemoggastriázo* < *anemoggástri -iazo*
 ‘to have a false pregnancy’ false pregnancy Dsuf
anemoggástri < *anem(os) ggastr(i)*
 ‘false pregnancy’ wind pregnancy
- c. *vukentrízo* < *vúkentro -izo*
 ‘sting/hit the oxen with the gad’ gad Dsuf
vúkentro < *vus kentr(i)*
 ‘gad, stick for hitting the oxen’ ox pointed stick
- d. *vrakozoniázo* < *vrakozóna -iazo*
 ‘put on the breech-belt’ breech-belt Dsuf

vrakozóna < *vrak(a) zon(i)*

‘breech-belt’ breech belt

e. *vullokeróno* < *vullokéri -ono*

‘put sealing wax’ sealing wax Dsuf

vullokéri < *vull(a) ker(i)*

‘sealing wax’ seal wax

These formations should be considered de-compounds since they are based on attested compounds. Of importance is that these de-compounds preserve the meaning of the compound on which they are based. By way of example, the formation *vullokeróno* in (60e) does not mean ‘to put any kind of wax’ but a special ‘kind of’ wax, that is, *vullokéri* ‘sealing wax’. Even more clearly, *anemoggastriázo* ‘to have a false pregnancy’ preserves the particular meaning of its base *anemoggástri* ‘false pregnancy’.

These formations also raise the issue of inconsistency between morphophonological and semantic properties. Consider the formation *vukentrízo* (60c) in which the second constituent is identical (at least phonologically) to the independently attested word *kentrízo* ‘to sting, to nettle’. In what follows, I comment on whether *vukentrízo* is a [N V] compound as depicted in (61a), or a [[N N] -Dsuf_v] formation as shown in (61b):

(61) a. [vu [kentr- -izo]]

b. [[vu kentr-] -izo]

In order to solve this apparent bracketing paradox let us comment on both the structural and semantic properties of *vukentrízo*.

First, if *vukentrízo* was a [N V] compound, i.e. *vu(s)* ‘ox’ + *kentrízo* ‘to sting’, its meaning would be ‘to sting/hit the oxen’. The meaning of *vukentrízo*, however, is ‘to sting/hit with the gad’. That is, this de-compound preserves the specific meaning of the noun *vúkentro* which is ‘gad’.

Second, let us consider theta-role saturation in verbal compounds. Consider for example the lexical-semantic representation of the compound *xartopézo* ‘to card-play’:

(62) [+material ([_i])] [+dynamic ([_{sentient, volitional}], [_i])]

xart- ‘card’ *pezo* ‘play’

The conceptual structure in (62) shows that the “R” argument of the noun *xart-* ‘card’ is co-indexed with the internal argument of the verb *pézo*. As a result, the theme argument is saturated inside the compound and is no longer available to syntactic theta-role saturation.

As argued for by Di Sciullo and Ralli (1999), compound-internal theta-role saturation blocks saturation on the sentence level. Consider, for example, the ungrammaticality of the phrase in (63) in which the theme is saturated twice:

- (63) **Xartopézo xartiá*.
 ‘I card-play cards’

This phrase is ungrammatical since the theme role of the verb *pézo* ‘to play’ is satisfied both inside the compound *xartopézo* ‘to card-play’ and on the level of the sentence *xartopézo xartiá* ‘to card-play cards’.

Consider, however, the phrase in (64) with the de-compound *vukentrízo*:

- (64) *Vukentrízo ta vódia gia na kinúnte pio grígora*.
 ‘I (ox-)sting the oxen to move faster’

If *vukentrízo* was a [N V] compound like *xartopézo*, (64) would be ungrammatical since we would have double saturation of the theme role of the verb *kentrízo* ‘to sting’. That is, the theme role would be saturated both inside and outside the compound (i.e. on the sentence level). The grammaticality of (64) can only be explained if we assume that *vukentrízo* is a de-compound based on the nominal base *vúkentros*. A corollary of this is that the theme role is saturated only once, that is, on the sentence level by the noun *vódia* ‘oxen’; there is no saturation of the theme inside the de-compound *vukentrízo*.

The foregoing discussion strongly suggests that the formations in (60) are secondary derivatives based on nominal compounds. That is, they follow the structural pattern depicted in (65a) and not in (65b):

- (65) a. [[stem1 stem2]_N Dsuf_V]_V
 b. [stem1 [stem2 Dsuf_V]_V]

Observe that the verbal de-compounds in (60) are secondary formations based on endocentric [A/NN] compounds. In (66), I present verbal de-compounds based on exocentric compounds:

- (66) a. *aniktokardízo* < *aniktókartos* -izo
 ‘become cheerful’ cheerful Dsuf

aniktókartos < *anikt(i) kard(ia)*
 ‘open-hearted, cheerful’ open heart
- b. *asproxiliázo* < *asproxilis* -iazo
 person with white lips because of fear Dsuf
 ‘to have white lips because of fear’

asproxilis < *aspr(o) xil(os)*
 ‘person with white lips because of fear’ white lip

These formations can be considered true de-compounds since as far as semantics is concerned, they are clearly related with the bases they originate from. The formation *aniktokardízo* in (66a) preserves the meaning ‘cheerful’ which is evident in the bahuvrihi *aniktókartos*. In a similar vein, *asproxiliázo* does not just mean ‘to have white lips’ but it shows the specific part of meaning ‘because of fear’, i.e. ‘to have white lips because of fear’, which appears in the bahuvrihi *asproxilis* which serves as a base for the derivation of the verbal de-compound *asproxiliázo*.

Let us now consider formations which blur the distinction between compounds and de-compounds.

- (67) a. *aspromustakiázo* < *aspr(o) mustak(i)* -iazo
 ‘get a white mustache’ white mustache Dsuf

aspromústakos < *aspr(o) mustak(i)*
 ‘with a white mustache’ white mustache
- b. *aspromalliázo* < *aspr(o) mall(i)* -iazo
 ‘get white hair’ white hair Dsuf

aspromállis < *aspr(o) mall(i)*
 ‘with white hair’ white hair

These formations cannot be easily classified as true de-compounds, that is, secondary formations on an attested base. The semantics of these formations blur the distinction

between de-compounds and compounds because, contrary to (60) and (66), it is not clear whether there is a derivational relation between *aspromustakiázo*, for example, and *aspromústakos*.

To be more specific, the formations in (60) and (66) are classified as de-compounds because their semantics shows that there is a derivational relation between them and the compounds they originate from. The semantics of the formations in (67), however, does not provide us with clear evidence as to their classification as true de-compounds. In more detail, when we apply the semantic criterion to *aspromustakiázo*, we cannot decide whether this verb is derivationally related with the bahuvrihi *aspromústakos* ‘white-mustached’ or the possible *aspromústako* ‘white-mustache’ which is the base for *aspromústakos* ‘white-mustached’.⁶ Does *aspromustakiázo* mean ‘to get a white mustache’ or ‘to become a white-mustached person’? The former meaning shows that the verb *aspromustakiázo* is formed by the addition of the verbal *-iazo* to the possible endocentric *aspromústako*, whereas, the latter meaning highlights the derivational relation between this verb and the bahuvrihi *aspromústakos*. If we follow the dictionary entry for this verb, we have to accept that it is based on the possible compound *aspromústako* since its meaning is ‘to get a white-mustache’. As a result, *aspromustakiázo* would be a verbal bahuvrihi compound which is the rarest type of bahuvrihis in the languages of the world (see the work of Bauer, 2008b). I will, nevertheless, leave this issue open since I know of no tests which could help us decide whether the formations in (67) should be considered true de-compounds or exocentric verbal bahuvrihis.

That the creation of exocentric compounds in Greek and its dialects is a very prolific process is evident in the presence of verbs which are based on non-attested compounds. Consider the following examples:

- (68) *varikartízo* < *var(ia) kardi(a) -izo*
 ‘lit. to have a heavy heart, to be sad’ heavy heart Dsuf
- kalozoízo* < *kal(i) zo(i) -izo*
 ‘to have a good life’ good life Dsuf

⁶As mentioned above, there is a derivational relation between bahuvrihi compounds and nominal [A/N N] compounds. As a result, the bahuvrihi *aspromústakos* ‘white-mustached’ is derivationally related with the possible compound *aspromústako* ‘white-mustache’.

<i>kakoniktízo</i>	<	<i>kak(i)</i>	<i>nikt(a)</i>	<i>-izo</i>
‘to have a bad night’		bad	night	Dsuf
<i>kakoreksízo</i>	<	<i>kak(i)</i>	<i>oreks(i)</i>	<i>-izo</i>
‘to be in a bad mood’		bad	mood	Dsuf
<i>kalostratízo</i>	<	<i>kal(i)</i>	<i>strat(a)</i>	<i>-izo</i>
‘to wish someone a good trip’		good	way, street	Dsuf
<i>asimokalamízo</i>	<	<i>asim(i)</i>	<i>kalam(i)</i>	<i>-izo</i>
‘to twine the thread around silver coils’		silver	reed	Dsuf

In these formations, we observe that the verbal derivational suffix *-izo* attaches to a non-attested base. The Cypriot verbal bahuvrihi *varikartízo*, for example, is built as follows: the first step involves the combination of the stems of the words *var(ia)* and *kardi(a)* which results in the compound *varikard-* ‘heavy heart’. The second step consists of the subordination of the compound *varikard-* by the suffix *-izo*. This derives the meaning ‘to have a hard-heart’. Similarly, the remaining formations in (68) involve two stems plus a derivational suffix, namely *-izo*, which is responsible for the categorial feature V(erb).

Based on the distinction between endocentric and exocentric compounds, the formations in (68) should be considered exocentric compounds since they are based on the structure in (69):

(69) [[[stem1 stem2]_{STEM-Dsuf}]_{STEM-Infl}]_{WORD}

That is, in these formations, compounding and derivation co-occur and derivation follows compounding. As a result, the Cypriot adjectival bahuvrihi *aniktokutalátos* ‘broad-shouldered’ and the verbal bahuvrihi *varikartízo* ‘to have a hard-heart, to be sad’ are based on the same structural pattern. They involve two stems plus an affix, an adjectival suffix in *aniktokutalátos* and a verbal suffix in *varikartízo*.

A question we should address is the demarcation between (true) de-compounds and (true) exocentric compounds. More specifically, we should answer the question whether we should collapse these two categories since Greek data shows that both de-compounds and exocentric compounds involve compounding and derivation in this particular order.

It is the contention of the present thesis that de-compounds and exocentric compounds should be kept distinct because in the latter, the two stems only combine for the purposes of derivation. As we already mentioned, exocentric compounds, adjectival and verbal bahuvrihis included, involve the suffixation of a nominal base which results from the combination of two stems (or a word and a stem). This nominal base is a possible but non-attested compound. In the Cypriot *aniktokutalátos* ‘broad-shouldered’, for instance, although the compound *aniktokutála* ‘broad shoulder’ is not attested, the stems *anikt-* ‘broad’ and *kutal-* ‘shoulder’ combine because of the derivational suffix *-atos* which is responsible for the creation of the exocentric *aniktokutalátos* ‘broad-shouldered’. In other words, in exocentric compounds we have compounding for the purposes of derivation. On the contrary, in true de-compounds, the compound which serves as a base for the derivation is independently attested and motivated. That is, in true de-compounds there is no compounding for the purposes of derivation.

The difference between de-compounds and exocentric compounds is important since a de-compound may be formed on the basis of both endocentric (60) and exocentric (66) compounds. By way of example, *anemoggastríazo* ‘to have a false pregnancy’ is a de-compound based on the endocentric *anemoggástri* ‘false pregnancy’ and *aniktokardízo* ‘to become cheerful’ is a de-compound based on the exocentric bahuvrihi *aniktókardos* ‘open-hearted, cheerful’. Given that a *de-compound* can have an endocentric or an exocentric compound as base, de-compounds and exocentric compounds should be treated as different types of word formation despite the fact that it is not an easy task to propose a clear-cut distinction between true compounds and true derivatives.

8.7 Conclusions

In this chapter, I focused on the relation between the two word-formation processes, compounding and derivation. First, I argued that this relation is of the utmost significance for the study of exocentric compounding since in Greek exocentric formations, compounding and derivation co-occur. In addition, I argued that the derivational suffix which serves as the head of the word may be overt or zero. Evidence in favour of overt- and zero-derivation comes from the presence of several minimal pairs of exocentric compounds with and without an overt suffix. In addition, as I showed, suffixation

can be traced in similar formations from several languages.

A central issue in the study of these formations was the inconsistency between the structure suggested by their morphophonological properties and the structure suggested by their meaning. In order to address this issue, I analyzed adjectival bahuvrihis and Homeric prepositional compounds as *bracketing paradoxes* and I proposed that these formations are created on the basis of the structure $[[\text{stem1}/\text{word stem2}]_{\text{STEM}} -\text{Dsuf}]_{\text{STEM}} -\text{Infl}]_{\text{WORD}}$.

Based on the analysis of various structural patterns of endocentric and exocentric patterns I proposed that exocentricity is an epiphenomenon, reflecting a particular order of application of compounding and derivation. That is, when compounding and derivation co-occur within the same morphologically complex item, compounding precedes derivation. In contrast, a structure is endocentric if it contains only compounding, or involves derivation and compounding, in this particular order. This ‘formal’ definition of the distinction between endo- and exo-centric formations makes no reference to notions such as lexicalization, non-compositionality, and semantic drift which have been introduced into the discussion with respect to the distinction between ‘headed’ and ‘headless’ formations and which are based on the rather loose hyponymy test.

The concept of the distinction between endocentric and exocentric formations which I defended in the present thesis, does not treat exocentric compounds as exceptions or as formations which are negatively defined by not being endocentric, but as configurations of two stems (or a word and a stem) which undergo suffixation. This conclusion is corroborated by data from all evolutionary stages of the Greek languages and by several types of compounds which have been treated as exocentric in literature.

Finally, I commented on the distinction between de-compounds and exocentric compounds and argued that exocentricity is compounding for the purposes of derivation. In addition, given that a *de-compound* can have an endocentric or an exocentric compound as base, de-compounds and exocentric compounds should be treated as different types of word formation.

Conclusions

The purpose of the present thesis was to sort out some of the confusions associated with head, focusing on headedness in Word Formation and Lexical Semantics. In particular, the purpose of this thesis was to enquire into the notion head focusing on the following three issues:

- (a) delimitation,
- (b) position, and
- (c) presence and absence of head in morphological configurations.

The study of these three questions allowed us to comment on (a) the relation between Morphology and Lexical Semantics and (b) the Morphology-Syntax interface.

In Part II, I addressed the question of delimitation and definition of head. In particular, I argued that head is usually defined in such a broad way that the application of this notion to morphological analysis is rendered highly problematic. A corollary of this is that head has been used as a notion which unifies a number of other notions, including amongst others the *subcategorizand* and the *morphosyntactic locus*.

The presentation of the various criteria for the identification of head in Chapter 3, revealed that most of the assumed head-like notions, such as the *subcategorizand*, might

very well not be relevant to the head-nonhead asymmetry. The discussion of the results of the various headship criteria argued in favour of a strictly categorial definition of head, in that the head for the purposes of morphology should be identified with the *category determinant*.

In Chapter 4, I investigated the way the head-nonhead asymmetry should be accounted for in Lexical Semantics. My work showed that the identification of head by the criterion of hyponymy should be reconsidered since hyponymy is a relation among the things lexical items describe and is available as part of our knowledge of the world. As a result, a number of arguably headed formations are rendered headless by the hyponymy test, since (a) hyponymy can only relate the pragmatic bodies and not the grammatical skeletons of two items and (b) the pragmatic body is amenable to undergo semantic drift (e.g. lexicalization). In order to solve these issues, I argued that the head for the purposes of Lexical Semantics should be a matter of the skeletal features of a morpheme and, more specifically, the head should be identified with the *ontological class determinant*.

The application of the notion head to the creation of semantically complex configurations revealed that *subordination of functions* should be split into subordination of functions with and without co-indexation. In particular, I argued that non-argument-taking inflection, prefixation, and evaluative morphology should be accounted for by the same mechanism, namely *subordination of functions without co-indexation* (addition of functions).

Following Lieber (2004), I also argued that morphemes should be classified according to two main criteria: (a) the semantic features which are relevant to each morpheme and (b) the internal organization of the lexical-semantic representation of a morpheme. In this respect, the distinction between prefixes and suffixes which is based on the linear order of morphemes cannot be used as a criterion in Lexical Semantics. Finally, the comparison between the prefix *re-* and the plural suffix *-s* revealed that these two affixes have shared properties (similar skeletal organization and quantificational features) which can only be accounted for under a lexical-semantic approach.

In Part III, I focused on system-external and system-internal factors which govern constituent order in morphology, with special focus on Greek compounding. More specifically, although Greek compounds are generally right-headed, in Chapter 5, I

presented and analyzed a number of left-headed compounds from various evolutionary stages of the Greek language and its dialects (with focus on the dialects spoken in Southern Italy). First, I commented on whether left-headedness in the dialects of Southern Italy could be attributed to the contact of Greek with Italian which exhibits left-headed compounds and I then presented data from previous evolutionary stages of the Greek language which shows that the particular behaviour of these formations should not be attributed to language interference.

In Chapter 6, I focused on the examination of system-internal factors which could affect the head-dependent linearization. My analysis of left-headed compounds revealed that the order of constituents in compounds may not be autonomous from syntax since the head-nonhead linearization inside compounds cannot change without previous change in the head-nonhead order in syntactic constructions and that morphological rules of compounding can be emergent from syntactic rules. This conclusion challenged the validity of the *Lexical Integrity Hypothesis* and the idea that the order of elements inside compound words only obeys morphological settings.

In Part IV, I focused on the presence and absence of head which cut across the distinction between endocentric and exocentric compounds. In Chapter 7, I critically evaluated literature on this issue and presented data which militates against recent proposals that exocentricity and the notion head can be split into *morphological*, *semantic*, and *categorial*. Based on the distinction between nominal and adjectival bahuvrihis, which is often not taken into consideration by scholars, I proposed that the former should be analyzed via metonymy and that the latter can be better understood if we examine the relation between compounding and derivation.

In Chapter 8, I focused on the relation between the two word-formation processes, compounding and derivation and offered a unified formal account of configurations from several stages of the Greek language (e.g. Homeric prepositional compounds, Modern Greek and dialectal adjectival bahuvrihis). In particular, I argued that the head in exocentric compounds is a derivational suffix (overt or zero) and presented evidence in favour of zero-derivation. In addition, I tackled the issue of the inconsistency between the structure suggested by the morphophonological properties and the structure suggested by the meaning of exocentric compounds (*bracketing paradoxes*). Finally, I commented on the distinction between de-compounds and exocentric compounds and

argued that exocentricity is compounding for the purposes of derivation.

My work on the notion head in Word Formation and Lexical Semantics raised a number of secondary questions, some of which I addressed in the present thesis. By way of example, my analysis of the presence and absence of head in Part IV raised a number of questions such as the relation between compounding and derivation, bracketing paradoxes, and the demarcation between de-compounds and exocentric compounds. In addition, my work on the head-dependent linearization revealed that the order of morphemes inside compounds may not always obey morphological settings and that syntactic and semantic (*temporal iconicity*) settings may also be relevant to this linearization. Finally, the proposal that morphemes should be classified according to the internal organization of their skeleton and the features which are relevant to each morpheme, allows one to reassess the demarcation between the various morphological processes. I hope that future work will address in more detail the questions which the present analysis of head has raised.

Appendices

Left-headed compounds

In what follows, I present left-headed [N N] compounds from previous evolutionary stages of Greek and from Greek dialects. Consider first the following compounds from Ancient, Koine, and Medieval Greek:

(1) *agkul-o-blephar-on* < *agkul(ion) blephar(on)* *Cels.7.7.*

loop-LE-eyelids-Infl loop eyelids
‘adhesion of the eyelids’

agkul-o-glo:ss-on < *agkul(ion) glo:ss(a)* *Orib.45.15 tit.*

loop-LE-tongue-Infl loop tongue
‘contraction of the tongue’

akr-axon-ion < *akr(a) ax(o:n)* *Poll.1.145*

edge-axle-Infl edge axle
‘end of the axle’

akr-isch-ion < *akr(a) ischi(on)* *Orib.48.55.1*

edge-hip-Infl edge hip
‘end of the hip’

- akr-o-rrum-ion* < *akr(a) rhum(os)* *Poll.1.146.*
 edge-LE-pole-Infl edge pole
 ‘fore-end of a pole’
- akr-o-ste:th-ion* < *akr(a) ste:th(os)* *Arist.Phgn.810b17*
 end-LE-breast-Infl end breast
 ‘lower end of breast-bone’
- akr-o-stom-ion* < *akr(a) stom(an)* *D.H.Com14.*
 edge-LE-mouth-Infl edge mouth
 ‘edge of the lips’
- aphr-o-nitr-on* < *aphr(os) nitr(on)* *Gal. 12.212*
 foam-LE-sodium-Infl foam sodium carbonate
 ‘native sodium carbonate’
- basan-astragal-e:* < *basan(os)* *astragal(e:)* *Luc.Trag.199*
 torture-joint-Infl tortures (of disease) one of the vertebrae
 ‘plague of the joints, of the gout’
- cheir-o-drako:n* < *cheir drak(o:n)* *E.El.1345*
 hand-LE-dragon hand dragon, serpent
 ‘with serpent hands or arms’
- kabl-o-kunar-a* < *kabl(os) kunar(a)* *Gp.20.31.*
 stem-LE-artichoke-Infl stem artichoke
 ‘artichoke stem’
- karp-o-balsam-on* < *karp(os) balsam(on)* *Gal.14.166*
 fruit-LE-balsam-Infl fruit balsam
 ‘the fruit of the balsam’
- karp-o-cheir* < *karp(os) cheir* *Eust.1572.38.*
 palm-LE-hand-Infl palm hand
 ‘the palm of the hand’
- kokk-o-daphn-on* < *kokk(os) daphn(e:)* *Paul.Aeg.3.28*
 berry-LE-laurel-Infl seed, berry laurel
 ‘laurel berry’

- kre-o-kakkab-os* < *kre(as) kakkab(os)* *Ath.9.384d.*
 meat-LE-pot-Infl meat three-legged pot
 ‘meat hashed with fat and blood’
- kune:-pod-es* < *ku(o:n) pous* *X.Eq.1.15*
 fetlock-foot-Infl fetlock foot
 ‘fetlocks of a horse’
- lith-argur-os* < *lith(os) argur(os)* *Nic.Al.594*
 stone-LE-silver-Infl stone silver
 ‘litharge, lead monoxide’
- mes-o-daktul-on* < *mes(on) daktul(os)* *Dsc.4.186*
 middle-LE-finger-Infl middle point finger
 ‘space between two fingers or toes’
- mes-o-phru-on* < *mes(on) ophru(s)* *Placit.4.5.2*
 middle-LE-eyebrow-Infl middle point eyebrow
 ‘space between the eyebrows’
- methus-o-kottab-os* < *methus(os) kottab(os)* *Ar.Ach.525.*
 drunk-LE-cottabus-Infl drunk kind of game
 ‘drunk with cottabus-playing’
- odont-o-ker-as* < *odus ker(as)* *An.Ox.3.357.*
 tooth-LE-horn-Infl tooth horn
 ‘horn-tooth, i.e. tusk’
- odont-o-kun-es* < *odus ku(o:n)* *Ar.Byz.Epit. 142.22.*
 tooth-LE-dog-Infl tooth dog
 ‘canine tooth’
- op-o-kinnamo:m-on* < *op(os) kinnamo:m(on)* *Thphr. HP4.4.14.*
 juice-LE-kinnamon-Infl juice kinnamon
 ‘juice of kinnamon’
- patr-o-me:to:r* < *pat(e:r) me:t(e:r)* *Luc.Alex.58.*
 father-LE-mother-Infl father mother
 ‘mother’s father’

- phull-akanth-os* < *phull(on) akanth(a)* *Thphr.HP1.10.7, 6.1.3.*
 leaf-prickle-Infl leaf thorn, prickle
 ‘with prickly leaves’
- pod-e:nem-os* < *pous anem(os)* *Il. 2.786*
 foot-wind-Infl foot wind
 ‘windswift’
- sark-o-pu-on* < *sarx pu(on)* *Hp.Coac.615.*
 flesh-LE-matter-Infl flesh discharge from a sore, matter
 ‘purulent flesh’
- spod-o-kramb-e:* < *spod(ia) kramb(e:)* *Zos.Alch.p.226 B.*
 ash-LE-cabbage-Infl ashes cabbage
 ‘cabbage-ash’
- the-oin-os* < *the(os) oin(os)* *A.Fr.382*
 god-wine-Infl god wine
 ‘god of wine’
- xiph-o-drepan-on* < *xiph(os) drepan(e:)* *Ph.Bel.99.51*
 sword-LE-sickle-Infl sword sickle
 ‘sickle-shaped sword’
- xul-o-balsam-on* < *xul(on) balsam(on)* *Gal.14.166*
 wood-LE-balsam-Infl wood balsam
 ‘the wood of balsam’
- xul-o-karpas-on* < *xul(on) karpas(os)* *Gal.19.738*
 wood-LE-flax-Infl wood flax
 ‘wood of flax’

In what follows, I present data from Modern Greek dialects:

- (2) *agratht-o-sider-o* < *adraxt(i) sider(o)* Italiot
 spindle-LE-iron-Infl spindle iron
 ‘iron spindle’

- adelf-o-gampr-os* < *adelf(os) gampr(os)* Peloponnese
 brother-LE-brother_in_law-Infl brother brother in law
 ‘brother of brother in law’
- akr-o-dom-a* < *akr(o) dom(a)* Cypriot
 edge-LE-roof-Infl edge roof
 ‘roof-edge’
- apid-o-kolokith-o* < *apid(i) kolokith(i)* (Andriotis, 1939: 131)
 pear-LE-pumkin-Infl pear pumpkin
 ‘a kind of pear, which is similar to pumpkin’
- artsi-o-petin-o* < *arts(i) petin(os)* Cypriot
 testicle-LE-rooster-Infl testicle rooster
 ‘lit. the testicles of rooster, edible bulb’
- avg-o-kalamar-o* < *avg(o) kalamar(i)* Andros, Ionia
 egg-LE-squid-Infl egg squid
 ‘eggs of squid’
- afent-ampel-os* < *afent(is) ampel(i)* Cephalonia
 lord-vine_yard-Infl lord vine yard
 ‘lord of the vine yard’
- axnar-o-pod-o* < *axnar(i) pod(i)* Cypriot
 print-LE-foot-Infl print foot
 ‘foot-print’
- fidd-ambel-o* < *fidd(o) ambel(i)* Italiot
 leaf-LE-vine-Infl leaf vine
 ‘vine leaf’
- fill-o-kart-i* < *fill(o) kard(ia)* Cypriot
 leaf-LE-heart-Infl leaf heart
 ‘lit. leaf of heart, innermost recesses of one’s heart’
- fill-o-krommid-o* < *fill(o) krommid(i)* Cypriot
 leaf-LE-onion-Infl leaf onion
 ‘onion-leaf’

<i>fill-o-parethir-o</i>	< <i>fill(o) parathir(o)</i>	Cephalonia
leaf-LE-window-Infl	leaf window	
‘casement’		
<i>frid-o-mat-o</i>	< <i>frid(i) mat(i)</i>	Cephalonia
eyebrow-LE-eye-Infl	eyebrow eye	
‘eyebrow’		
<i>gial-o-pag-i</i>	< <i>gial(i) pag(os)</i>	Thrace
glass-LE-ice-Infl	glass ice	
‘ice glass’		
<i>gir-o-fustan-a</i>	< <i>gir(os) fustan(i)</i>	Naxos
hemline-LE-dress-Infl	hemline dress	
‘dress hemline’		
<i>kalam-o-xer-o</i>	< <i>kalam(i) xer(i)</i>	(Andriotis, 1939: 131)
reed-LE-hand-Infl	reed hand	
‘arm bone, humerus’		
<i>kari-o-lem-i</i>	< <i>kari(di) lem(os)</i>	Cypriot
walnut-LE-throat-Infl	walnut throat	
‘lit. walnut of the throat, adam’s apple, carotid’		
<i>karp-o-xer-o</i>	< <i>karp(os) xer(i)</i>	Samothrake
palm-LE-hand-Infl	palm hand	
‘the palm of the hand’		
<i>katofl-o-port-o</i>	< <i>katofl(i) port(a)</i>	Cephalonia
doorstep-LE-door-Infl	doorstep door	
‘doorstep’		
<i>kefal-o-trapez-o</i>	< <i>kefal(i) trapez(i)</i>	(Andriotis, 1939: 131)
head-LE-table-Infl	head table	
‘honorary seat at the table’		
<i>klon-o-spart-o</i>	< <i>klon(o) spart(o)</i>	Italiot
twig-LE-sedge-Infl	twig sedge	
‘twig of sedge’		

- kokkon-o-sik-o* < *kokkon(a) sik(o)* Cypriot
 seed-LE-fig-Infl seed fig
 ‘fig-seed’
- kol-o-riz-o* < *kol(os) riz(a)* Cypriot
 bottom-LE-root-Infl bottom root
 ‘deep end of a root’
- kork-o-ššin-o* < *kokk(o) ššin(o)* Italiot
 seed-LE-pistacia-Infl fruit/seed pistacia
 ‘fruit/seed of pistacia’
- kotsir-o-egi-o* < *kotsir(os) egi(a)* Cypriot
 dropping-LE-goat-Infl dropping goat
 ‘goat-dropping’
- kotsir-o-gaur-o* < *kotsir(os) ga(id)ur(i)* Cypriot
 dropping-LE-donkey-Infl dropping donkey
 ‘donkey-dropping’
- ksil-o-kalts-o* < *ksil(o) kalts(a)* Kythnos
 wood-LE-sock-Infl wood sock
 ‘wood for knitting socks’
- kukk-o-dafn-a* < *kukk(i) dafn(i)* (Andriotis, 1939: 115)
 seed-LE-laurel-Infl seed laurel
 ‘laurel seed’
- lak-o-furn-i* < *lak(os) furn(os)*
 hole-LE-oven-Infl hole oven
 ‘a hole in the oven for collecting the ash’
- mall-o-kefal-a* < *mall(i) kefal(i)*
 hair-LE-head-Infl hair head
 ‘head hair’
- manik-o-pukamis-o* < *manik(i) pukamis(o)* (Andriotis, 1939: 131)
 sleeve-LE-shirt-Infl sleeve shirt
 ‘shirt sleeve’

<i>mastr-o-mil-o</i>	< <i>matr(a) mil(o)</i>	Italiot
trough-LE-mill-Infl	the trough mill	
	‘the trough into which the flour from the mill is collected’	
<i>pets-o-pod-ia</i>	< <i>pets(a) pod(i)</i>	Naxos
skin-LE-foot-Infl	skin foot	
	‘foot skin’	
<i>pit-o-mel-i</i>	< <i>pit(a) mel(i)</i>	Chios
pie-LE-honey-Infl	pie honey	
	‘pie with honey’	
<i>pod-o-krevat-o</i>	< <i>pod(i) krevat(i)</i>	Peloponnese
leg-LE-bed-Infl	leg bed	
	‘bed leg’	
<i>psalid-o-ker-i</i>	< <i>psalid(i) ker(i)</i>	(Andriotis, 1939: 115)
scissors-LE-candle-Infl	scissors candle	
	‘scissors used for cutting candles’	
<i>riz-aft-i</i>	< <i>riz(a) aft(i)</i>	Cypriot, Karpathos, Italiot
base-ear-Infl	root, base ear	
	‘ear-base’	
<i>riz-o-dont-i</i>	< <i>riz(a) dont(i)</i>	(Andriotis, 1939: 130)
root-LE-tooth-Infl	root, base tooth	
	‘root of the tooth’	
<i>riz-o-gloss-a</i>	< <i>riz(a) gloss(a)</i>	Peloponnese
root-LE-tongue-Infl	root, base tongue	
	‘root of the tongue’	
<i>riz-o-plak-o</i>	< <i>riz(a) plak(a)</i>	Italiot
root-LE-stone_plate-Infl	root stone_plate	
	‘the root of the stone plate’	
<i>riz-o-vrax-a</i>	< <i>riz(a) vrax(os)</i>	Aetolia
root-LE-rock-Infl	root, base rock	
	‘root of the rock’	

- riz-o-vun-i* < *riz(a)* *vun(o)* (Andriotis, 1939: 130)
 root-LE-mountain-Infl root, base mountain
 ‘foot/base of the mountain’
- rog-o-viz-i* < *rog(a)* *viz(i)* (Andriotis, 1939: 131)
 teat-LE-udder-Infl teat udder
 ‘the teat of the udder’ teat udder
- sakk-o-krevat-i* < *sakk(o)* *krevat(i)* Italiot
 bag-LE-bed-Infl bag bed
 ‘lit. bag of the bed, mattress’
- ššul-o-potam-o* < *ššul(o)* *potam(o)* Italiot
 wood-LE-river-Infl wood river
 ‘lit. wood of the river, driftwood’
- ššul-o-furr-o* < *ššul(o)* *furn(o)* Italiot
 wood-LE-oven-Infl wood oven
 ‘timber for the oven’
- sor-o-lith-os* < *sor(os)* *lith(os)* Pontic
 pile-LE-stone-Infl pile stone
 ‘a pile of stones’
- skat-o-pontik-o* < *skat(o)* *pontik(o)* Italiot
 dropping-LE-mouse-Infl droppings mouse
 ‘lit. droppings of mouse, worthless person’
- ski-o-dentr-i* < *ski(a)* *dentr(o)* Karpathos, Ikaria
 shadow-LE-tree-Infl shadow tree
 ‘tree shadow’
- skol-o-lampr-a* < *skol(i)* *lampr(i)* (Andriotis, 1939: 115)
 holidays-LE-Easter-Infl holidays Easter
 ‘Easter holidays’
- spor-o-marath-o* < *spor(o)* *marath(o)* Italiot
 seed-LE-fennel-Infl seed fennel
 ‘fennel seed’

<i>stom-o-lakk-o</i>	< <i>stom(a) lakk(os)</i>	Cypriot
mouth-LE-well-Infl	mouth well	
‘well-mouth’		
<i>stragal-o-pod-o</i>	< <i>(a)stragal(os) pod(i)</i>	Zakynthos
ankle-LE-foot-Infl	ankle foot	
‘ankle’		
<i>viz-askel-o</i>	< <i>viz(i) askel(a)</i>	Naxos
breast-plant-Infl	breasts kind of plant	
‘tubers of plant’		
<i>xer-o-sikl-i</i>	< <i>xer(i) sikl(a)</i>	Italiot
handle-LE-bucket-Infl	hand, handle tin bucket	
‘handle of tin bucket’		
<i>xer-o-murtar-o</i>	< <i>xer(i) murtar(i)</i>	Italiot
handle-LE-mortar-Infl	hand, handle mortar	
‘lit. hand of the mortar, pestle’		
<i>xil-o-gkrem-i</i>	< <i>xil(os) gkrem(os)</i>	Peloponnese
edge-LE-cliff-Infl	edge cliff	
‘cliff edge’		
<i>xil-o-potam-o</i>	< <i>xil(os) potam(os)</i>	Cypriot, Cappadocian
edge-LE-river-Infl	edge river	
‘riverside’		
<i>xort-anem-i</i>	< <i>xort(o) anem(o)</i>	Italiot
grass-wind-Infl	grass wind	
‘lit. grass of the wind, kind of grass’		
<i>zevg-ornith-o</i>	< <i>zevg(os) ornith(a)</i>	Cephalonia
couple-chicken-Infl	couple chicken	
‘chicken couple, i.e. a rooster and a chicken’		

On the history of the notion exocentricity

Modern scholarship holds the view that the distinction between endocentric and exocentric compounds was introduced into linguistic theory by Bloomfield (Bauer, 2008b: 52; Bauer, 2006: 724). In what follows, I will argue that it seems safe to suggest that this is not accurate, since (a) this distinction may have Sanskrit origins and (b) several authors had already used the notion of exocentricity before Bloomfield. Of importance to our argumentation is that the presentation of the work of scholars such as Tserepis (1880, 1902), will allow us to introduce the distinction between nominal and adjectival bahuvrihis.

First, it has been argued that the distinction between endocentric and exocentric compounds is not a novel distinction and that it has Sanskrit origins. Wujastyk (1982: 181-182), for example, argues that Bloomfield's terminology might be related to the Sanskrit terms *anyapadārtha* and *svapadārtha*. The former denotes a compound the sense of which is some other external word and the latter refers to a compound the sense of which is one of its constituents. Both terms are used by the Sanskrit grammarian Patañjali. It should be noted that *anyapadārtha* which is the equivalent of *exocentric* was

introduced by Pāṇini himself. It should also be mentioned that Bloomfield, in *Language*, makes use of Sanskrit terms when he discusses the classification of compounds, and it is therefore possible that his endocentric and exocentric terminology is an adaptation of the terminology used by Sanskrit scholars. In fact, Bloomfield makes use of the term *bahuvrihi* as equivalent to the term *exocentric*. This seems to be very close to Pāṇini's original use of the term *bahuvrihi* since Pāṇini uses this term as a generic one and not as a term which is a subset of exocentric compounds.

Second, the distinction between endocentric and exocentric compounds was known to scholars before Bloomfield and the introduction of this distinction into modern literature should be attributed to Aleksandrov (1888) who argues for a distinction between *exocentric* and *esocentric* compounds.¹ Following Aleksandrov, a number of authors such as Brugmann (1906), Brugmann and Delbrück (1906), and Debrunner (1917) have also used this distinction (for more on this issue see Noordegraaf, 1989).

B.1 Higher and lower type of compounding

Of particular importance is that the distinction between *bahuvrihi* and the other types of compounds was known to authors before Aleksandrov, although the term *exocentricity* does not appear in these authors. Consider the work of Tserepis (1880: 419-421) who argues that compounds should be classified according to two criteria: (a) the relation between the compound members and (b) the relation of the most important element of the compound (i.e. what we now call *head*) to the sentence. The former gives us the distinction between *coordinate* and *subordinate* compounds. The latter derives the distinction between *avótepon* 'higher' and *katótepon* 'lower' type of compounding. To the best of my knowledge, the distinction between *höhere* 'higher' and *niedere* 'lower' type of composition first appears in Justi (1861: 80).

Of importance to our study is that Tserepis argues that *bahuvrihis* belong to the *higher* type of compounding, whereas all the other types are classified as *lower*. Although, he does not use the terms *endocentric* and *exocentric*, the distinction between *higher* and *lower* type of compounding is equivalent to the more modern terminology. Tserepis (1902: 640), argues that *bahuvrihi* compounds are classified as *higher* because

¹It is possible that Aleksandrov's terminology is an adaptation of the Sanskrit terminology, but this does not change that fact that credit for the introduction of the term *exocentricity* is not due to Bloomfield.

although they are (inherently) nouns, they become adjectives under composition. In the class of *lower* compounds, however, no change in lexical category is attested. Due to this change of category, i.e. from nouns to adjectives, Tserepis argues that in order to understand the relation of the centre of the compound to the sentence, we usually need to use the participle of the verb ‘to have’ (bahuvrihi compounds denote ‘someone who has X’).²

The identification of a relation between exocentricity and change in the lexical category of the compound, i.e. a change from noun to adjective, is very important for our discussion on the distinction between endocentric and exocentric compounds. Debrunner (1917) is only one of the various scholars who have used this distinction before Bloomfield. Debrunner (1917: 54-55) argues that a compound such as *me:tr-o-pato:r* ‘mother-LE-father, mother’s father’ is *esocentric* (*esozentrisch*) because the compound has its *centre*, what we would nowadays call *head*, inside the compound. The formation *hom-o-pato:r* ‘same-LE-father, having the same father’, however, is considered *exocentric* (*exozentrisch*) since in addition to the relation which holds between the constituents of the compound, the compound as a whole is in a relation to a substance which lies outside the compound. Debrunner also argues that the exocentricity of this compound manifests itself in the change of lexical category; the whole is an adjective despite the fact that both of its constituents are nouns. On the contrary, the *esocentric me:tr-o-pato:r* is a noun. This means that exocentricity in languages such as Sanskrit and Greek is not just a semantic phenomenon since it is marked by formal means as well (e.g. change of category by affixation).

²To the best of my knowledge, the relation between the terms *endocentric/exocentric* and *higher/lower* type of compounding has never been noticed in modern literature.

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