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The role of morphology in gender determination: evidence from Modern Greek*

Abstract

This paper deals with gender and the role of morphology in determining the different gender values in a morphologically rich language like Greek. It provides a theoretical account of gender in generative grammar and argues in favor of an organization of grammar where an autonomous morphological module interacts, in several aspects, with syntax, a lexicon, and a feature theory that feeds the other modules. Most claims and proposals are exemplified with evidence taken from Modern Greek where data about gender have been sporadically mentioned in the past and never studied systematically. Following a feature-based approach, it is argued that gender is an intrinsic property of lexical entries, namely of noun stems and derivational affixes. Considering features to be attribute-value pairs, entries are distinguished into two types: those characterized by a fully specified gender feature, that is, by a feature containing an attribute with a specific value part; and those that bear an underspecified gender feature, that is, an attribute without a value. It is proposed that the latter acquire the missing value either by some feature co-occurrence specification rules relating co-occurring features of the same lexical entry, or by another device operating outside morphology (e.g., agreement in syntax). Finally, it is shown that, without being specific to a particular process, gender is a lexical feature that actively participates in word-formation processes.

0. Introduction

In some languages, gender is central to their grammatical system, while in others it is absent. It is a feature that generally reflects a classification of nominal categories, but the question is to what extent this classification is arbitrary, i.e., based on morphological grounds, or semantically motivated by factors like sex or animacy (cf. Corbett 1991).

In this paper, I provide evidence to the claim that morphology plays a major role in determining gender, and, thus, argue in favor of an autonomous morphological module, interacting, in several aspects, with a lexicon, a feature theory and the other grammatical modules. For instance, I discuss the case that particular gender values may depend on syntactic considerations. It is shown that a proper account of this issue requires a morphology-syntax interaction and supports the recent proposals put forward by Di Sciullo (1996) and Booij (1997), according to which there is a modular architecture of grammar where modules interact with each other without losing their autonomy.

Most claims and proposals put forward in the paper are exemplified with evidence taken from Modern Greek (hereafter Greek), a language where gender plays an important role, since all nominal categories bear a gender feature that is relevant to both morphology and syntax (agreement). Greek nouns, adjectives, determiners, and a number of pronouns are marked for one of the three gender values, i.e., masculine, feminine or neuter, and are classified by traditional grammars (cf. Triantaphyllides 1991) into three classes according to the particular value they express. However, as shown in section 1.4, this classification does not correspond in an one-to-one way to the inflectional paradigms displayed by these categories. For instance, neuter nouns show a considerable inflectional variation, while the paradigm of nouns in –os

(e.g., tixos “wall”, isodos “entry”) contains nouns of two different values, masculine and feminine.¹ Furthermore, overlaps between the classes indicate that gender in Greek (especially for non-humans, see section 2.1) is not semantically grounded.

The paper focuses on Greek nouns that are inflected categories, composed of a stem and an overtly realized inflectional ending/affix.² Following a feature-based approach, it is argued that gender is an inherent property of stems, that is a feature that belongs to feature bundles characterizing noun stems listed in the mental lexicon. Considering features to be attribute-value pairs, it is shown that in certain stems, gender constitutes a fully specified feature, that is a feature containing an attribute with a particular value. In other cases, it constitutes an underspecified feature, that is. an attribute without a value part. It is claimed that a gender value is assigned to the latter by a feature-filling process. This process refers either to the application of a feature co-occurrence specification rule, relating co-occurring features of the same feature bundle, or to the operation of a grammatical device like agreement between structural constituents.

This work is divided in three main sections. In the first section, several important questions are raised with respect to the nature and the realization of gender in general, particularly gender in Greek. The questions of how gender is determined in nouns and what the relation is with the levels/modules of linguistic analysis are examined in the second section. Gender representation and gender assignment are the two topics investigated in the third section. The paper concludes with a summary of the basic points examined in the previous sections.

1. Basic questions about gender and its realization in Greek

Gender is an intricate subject to investigate. As Corbett (1991) points out, several questions arise with respect to its nature, its realization and its grammatical role.

1.1. How does the native speaker know the gender of a particular noun?

According to Anastasiadi-Symeonidi (1994),

- a) native speakers make few or no mistakes in the use of gender,
- b) borrowed nouns from other languages are always assigned a gender value - this is obvious from DPs like to film “the film.NEU”, to gol “the score.NEU (football)” o golkiper “the goalkeeper.MASC (football), etc. -
- c) when presented with invented words, speakers assign them a gender value with a high degree of consistency.

Therefore, a fundamental question, related to the above observations, would be whether gender is an intrinsic, arbitrary feature of nouns, or its presence is due to an assignment mechanism.

As is apparent from the work of Corbett (1991), gender is an inherent, classificatory property of nouns, and its realization generally depends on meaning, phonological, morphological and pragmatic factors, depending on the particular language we deal with.³

1.2. Is gender an inflectional category?

It could be claimed that gender in Greek is an inflectional category, like case and number, since it participates in agreement and varies according to the particular value it assumes. Greek adjectives, for example, agree in gender with their head nouns (cf. (1)), and vary in form according to the gender value they express (cf. (2) where adjectives are given in their citation form).

- (1)a. *orea* *jineka*

- | | | | |
|----|----------------|-------------|--|
| | beautiful.FEM | woman.FEM | |
| b. | oreos | kipos | |
| | beautiful.MASC | garden.MASC | |
| c. | oreo | koritsi | |
| | beautiful.NEU | girl.NEU | |
-
- | | | | |
|-------|----------------------|---------------------|---------------------|
| (2)a. | oreos | orea | oreo |
| | beautiful.MASC | beautiful.FEM | beautiful.NEU |
| b. | as ² imos | as ² imi | as ² imo |
| | ugly.MASC | ugly.FEM | ugly.NEU |

In addition to adjectives, there is also a limited set of nouns, like the ones in (3), where only the inflectional ending varies, depending on whether there is a masculine, feminine, or a neuter value.⁴

- | | | | |
|-------|------------|----------|-------------------|
| (3)a. | γatos | γata | γati ⁵ |
| | cat.MASC | cat.FEM | cat.NEU |
| b. | θios | θia | |
| | uncle.MASC | aunt.FEM | |

Despite the fact, however, that there is variation in form in the examples given in (2) and (3), depending on the gender value they assume, gender does not usually induce a set of word forms of a single noun stem. This applies to the vast majority of nouns that do not form “gender triples” in the same way that nouns form “case four-tuples” (nominative, genitive, accusative, and vocative forms). Moreover, for Spencer (1999:38), participation in agreement is not a criterion for assigning an inflectional character to gender, since gender is neither a purely contextual feature, nor a clearly inherent one (in Booij’s (1994) terms). Purely contextual features are not generally related to semantics, and clearly inherent features may participate in agreement but are not assigned/determined by it. They rather constitute the determining factor for triggering agreement.

It should be noticed that Ritter (1993) has claimed that gender is a derivational feature because, in Hebrew, it does not vary and its presence is related to word formation. The same observation can also hold for Greek, where derived nouns are often produced in order to provide a feminine counterpart to nouns denoting a masculine or a neuter gender value:

- | | | | |
|-------|--------------------|---------------|------------------|
| (4)a. | provatina | < provat- | ina ⁶ |
| | female sheep.FEM | sheep.NEU | suffix.FEM |
| b. | jitonisa | < jiton- | isa |
| | woman-neighbor.FEM | neighbor.MASC | suffix.FEM |

In (4), a feminine form is produced with the addition of a derivational affix (-ina or -isa) to a stem that is used in words of a masculine or a neuter value. In spite of the fact that gender may participate in a derivational process of constructing words like the examples given above, it cannot be characterized as a derivational feature since it also characterizes nouns that are not derivatives:

- | | |
|-------|-------------|
| (5)a. | porta |
| | door.FEM |
| b. | tavani |
| | ceiling.NEU |

c. tixos
wall.MASC

Therefore, gender is a feature of an ambiguous nature that may be involved in both derivation and inflection. Following Tiffou (ms.) and Spencer (1999), I would rather call it a lexical feature, in the sense that it characterizes lexical items, i.e., words of a nominal nature, independently of whether they are derived, non-derived, inflected or non-inflected, and for nouns, independently of any structural dependencies. This lexical character is also proved by the existence of loan words, like film “film.NEU”, permanant “permanent.FEM (hair perm.)”, etc., that are always assigned a specific gender value, even though they do not inflect and are not derived.

1.3. Is it easy to locate gender in word structure?

In inflected nouns composed of a stem and an affix, it is not always clear whether gender is a feature of the stem or a feature of the inflectional affix. Compare, for example, the following word pairs:

(6) a. noni	/	nones
godfather.MASC.NOM.PL		godmother.FEM.NOM.PL
b. δromi	/	isoði
road.MASC.NOM.PL		entry.FEM.NOM.PL

In (6a), form variation follows gender variation. Since form variation occurs at the affix (-i or -es), and the stem remains unchanged (non-), it could be argued that gender is provided by the inflectional affix. Look at (6b), however, where we have exactly the opposite situation: the stem varies (δrom- or isoδ-) while the affix remains unchanged (-i).⁷ Given the fact that gender is not related to any particular morphological marker in Greek, a quick answer to the question raised in this paragraph is almost impossible.

1.4. Does gender provide a classification to nouns?

In a number of languages, what we usually understand by gender is nothing but a classification system according to which nouns are distributed in classes. For instance, in Dravidian languages people talk of genders, while those working in Caucasian languages usually talk of noun classes (see Corbett 1991). Although the concept of gender often equals the concept of noun class, as Tiffou (ms.) points out, gender is not a universal criterion of classification. Therefore, in some languages, a distinction should be made between the notion of noun class, which has to be taken in a more general sense, and the notion of gender.

As will be clear below, in Greek, gender obeys to an internal necessity for grammatical classification. That is why what we tend to call gender is rather grammatical gender in spite of the fact that semantics plays a role in its assignment (see section 2.1). Beside gender, however, a noun class also contains the purely formal feature of inflection class (the term is covering the traditional terms of declension and conjugation) that is, a morphological indicator of the set of forms included in a word's inflectional paradigm. Both gender and inflection class provide a classification to nouns, but these features do not coincide.⁸ For instance, consider the examples in (7) where nouns of the same inflection class belong to different gender values.⁹ In these examples, gender provides a classification while inflection class does not.¹⁰

(7) IC1	
	SG
NOM a. anθropos	b. proodos

GEN	anθropu	prooδu
ACC	anθropo	prooδo
VOC	anθrope	prooδε
	PL	
NOM	a. anθropi	b. prooði
GEN	anθropon	prooδon
ACC	anθropus	prooδus
VOC	anθropi	prooði
	man.MASC	progress.FEM

As opposed to this, in (8) where nouns of the same gender value belong to different inflectional paradigms, only inflection class is responsible for providing a formal classification.

(8)	SG			
	IC5	IC6	IC7	IC8
NOM	a. vuno	b. xarti	c. kratos	d. soma
GEN	vunu	xartju	kratus	somatos
ACC	vuno	xarti	kratos	soma
VOC	vuno	xarti	kratos	soma
	PL			
NOM	vuna	xartja	krati	somata
GEN	vunon	xartjon	kraton	somaton
ACC	vuna	xartja	krati	somata
VOC	vuna	xartja	krati	somata
	mountain.NEU	paper.NEU	state.NEU	body.NEU

That a correlation between gender and inflection class is only partial suggests that the two features are independent. In fact, this independence is also supported by syntactic evidence. On the one hand, gender is syntactically relevant since it participates in the agreement process between nouns, adjectives and determiners:

(9)a.	aftos	o	kalos	anθropos
	this.MASC	the.MASC	good.MASC	man.MASC
	“this good man”			
b.	afti	i	kali	jineka
	this.FEM	the.FEM	good.FEM	woman.FEM
	“this good woman”			

Inflection class, on the other hand, is purely morphological. As shown by Ralli (1997), inflection class is a form indicator and participates in word formation by ensuring the right matching between stems and affixes. By assigning a particular inflection-class feature to both stems and affixes, we account for the right combination between stems and the appropriate inflectional affixes (e.g., vuno “mountain.NOM/ACC/VOC.SG < vun- [IC5] + -o [IC5]). See Ralli (1994, 1999, 2000a) for further details on this matching. Moreover, inflection class is not visible to syntax. The example below shows that it does not participate in syntactic agreement, while gender does:¹¹

(10)	Enas	vlakas	anθropos
	a.MASC.IC2	stupid.MASC.IC2	man.MASC.IC1

“A stupid man”

1.5. What is the relation between gender assignment and the levels/modules of linguistic analysis?

It should be noticed that, in some languages, e.g., French, there are convincing accounts of a phonologically-based gender assignment (cf. Schane 1968). In other languages, gender determination is triggered by semantics (e.g., Dravidian languages, cf. Corbett 1991). In fact, Tiffou (ms.) shows that originally, gender was a notion implying variation in meaning, but this notion was blurred in the course of historical linguistic evolution. But there are also languages where pure phonological or semantic criteria are not sufficient to determine gender and other formal criteria have to be sought. Generally, gender depends on two types of information, meaning and form. Meaning refers to features like animateness, sex, etc.¹² Information about form may be of two types: word structure and phonology. According to Corbett (1991), observation reveals that languages may use different combinations of these types of information and may also permit varying degrees of exceptions.¹³

2. Gender determination in Greek nouns

On the basis of the questions raised in the previous section, let us examine how gender is determined in Greek nouns.

2.1. Gender and semantics

Semantics plays an important role in determining gender in Greek. In most human nouns, sex distinction is reflected as a gender opposition between masculine and feminine nouns. Generally, the language distinguishes a form for males and a form for females in the citation form of nominative singular: masculine nouns usually end in –os, –as, and –is, and feminine nouns in –a, and –i.

- (11)a. anθropos “man, human being”
 b. maθitis “student”
 c. andras “man”
 d. jineka “woman”
 e. kori “daughter”

It is not the case, however, that the remaining nouns are neuter. Consider the nouns in (12).

- (12)a. kipos
 garden.MASC.NOM.SG
 pinakas
 blackboard.MASC.NOM.SG
 nixokoptis
 nail-clipper.MASC.NOM.SG
- b. isoδos
 entry.FEM.NOM.SG
 porta
 door.FEM.NOM.SG
 avli
 yard.FEM.NOM.SG

- b. nefos
 smog.NEU.NOM.SG
 kima
 wave.NEU.NOM.SG
 xjoni
 snow.NEU.NOM.SG

Following the above observations, semantics generally provides a gender distinction for humans since males are masculine and females feminine. As shown by the examples in (12), however, in non-humans, specific gender values are generally unpredictable.

2.2. Gender and phonology

Is gender phonological in Greek then? For a number of nouns, gender seems predictable from phonology. For instance, it may follow from the form of the noun in the nominative singular which is conventionally used as the citation form. However, simple phonologically-based rules relating a particular form of the nominative singular to a specific gender value may apply to certain cases, but are not sufficient to determine the gender of a noun.¹⁴ As shown by the examples in (12), in nominative singular, nouns ending in –os may be masculine, feminine or neuter, while nouns ending in –a/-i may be either feminine or neuter. In addition, attempts to use other case forms in order to justify a possible relationship between a phonological form and a gender value are less successful:

(13)a.		SG	
GEN	δromu	isoðu	vunu
	road.MASC	entry.FEM	mountain.NEU
ACC	δromo	isoðo	vuno
	road.MASC	entry.FEM	mountain.NEU
VOC	pinaka	xora	xoma
	blackboard.MASC	country.FEM	soil.NEU

b.		PL	
ACC	δromus	isoðus	
VOC	δromi	isoði	
	road.MASC	entry.FEM	
ACC/VOC	pinakes	xores	
	blackboard.MASC	country.FEM	
GEN	δromon	xoron	vunon
	road.MASC	country.FEM	mountain.NEU

In (13), nominal endings in –u, –o, and –a characterize nouns of the three gender values in the genitive, accusative and vocative singular whereas in the plural, there is only one genitive form, for the three gender values (i.e., –on in (13b)). As for masculine and feminine nouns, they share the same endings in both accusative and vocative (i.e., –us, –i, and –es in 13b)).

Furthermore, a gender assignment that would be based on the phonological form of the stem (as proposed by Aronoff 1992:21 for some Latin nouns), rather than on a particular case form (i.e., on the form of the inflectional affix), must also be rejected:

(14)a.	tix-os	ti <i>ϑ</i> (i) ¹⁵	pax-os
	wall.MASC	chance.FEM	obesity.NEU

b. μαγ-ος	φλόγ(α)	ριγ-ος
magician.MASC	flame.FEM	shiver.NEU

As shown by the examples in (14), Greek stems ending in a particular consonant belong to words of the three gender values.

Thus phonology is not a determining factor of gender in Greek.

2.3. Gender and morphology

A last attempt would be to determine gender morphologically, that is

- a) on the basis of inflection, namely by access to more than one case/number form, i.e., on the basis of access to the whole inflectional (declensional) paradigm, and/or
- b) by reference to the word-formation processes of derivation and compounding

First, reference to paradigmatic inflection that is expressed by the feature of inflection class (point a above) allows us to capture the systematic relationship that usually exists between gender and some inflection classes. By assuming Ralli's (1994, 2000a) division of Greek nouns into 8 inflection classes (cf. Appendix), we observe that:¹⁶

- a. Nouns of inflection-class type 2 are masculine:

- (15)a. μαθητής “student”
- b. φίλακας “guard”
- c. κέφτες “meat-ball”
- d. παπύς “grandfather”

- b. Nouns of inflection-class types 3 and 4 are feminine:

- (16)a. τύχη “chance” (ic3)
- b. χάρη “joy” (ic3)
- c. πόλις “town” (ic4)

- c. Nouns of inflection-class types 5, 6, 7, and 8 are neuter.

- (17)a. βουνό “mountain” (ic5)
- b. χάρτι “paper” (ic6)
- c. νέφος “smog” (ic7)
- d. χώμα “ground-soil” (ic8)

The close relation between gender and inflection class has been illustrated in other languages too. See, for example, works by Halle (1990) for Russian, Harris (1991, 1992) for Spanish and Corbett (1991) and Aronoff (1994) for a considerable number of languages.

Second, reference to morphological criteria allows us to predict that in derived nouns, the gender marker comes from the derivational affix and is inherited through headedness and percolation. For instance, we account for the fact that deverbal nouns in *-tis* (*κλέφτης* “thief”) and *-mos* (*καταστροφή* “destruction”) are masculine, deverbal nouns in *-ia* (*καλλιέργεια* “cultivation”) are feminine, denominal nouns in *-isa* (*γείτονα* “woman-neighbor”) are also feminine, and nouns in *-ma* (*φόρεμα* “dress”) and *-aki* (*ανθρωπάκι* “little man”) are neuter.

- (18)a. κλέφτης < κλέβ “(to) steal” -tis.MASC¹⁷
- b. καταστροφή < καταστρέφω “destroy” -mos.MASC

- c. kalierjia < kaliery “cultivate” –ia.FEM
 d. jitonisa < jiton.MASC “neighbor” –isa.FEM
 e. forema < fore “wear”¹⁸ –ma.NEU
 f. anθropaki < anθrop.MASC “man” –aki.NEU

See (19) below for an illustration of how gender is assigned in nouns bearing a nominal derivational affix:

- (19) forema.N.NEU “dress”
 / \
 fore.V ma.N.NEU

In this example, the derivational suffix -ma is the head of the structure. As such, it is responsible for the percolation of its features to the derived noun, that is, for the feature of noun and the feature of gender. Gender and category belong to the bundle of features that lexically characterize the entry of –ma. In this paper, it is assumed that affixes, as well as stems, are listed in a morpheme-based lexicon under the form of bundles of features.

Headedness and feature percolation are also responsible for assigning gender to compound words. Again, specific gender values are inherited from the head constituent that is usually the right-hand member in Greek compounds:¹⁹

- (20)a. nixokoptis < nix- koptis²⁰
 nail-clipper.MASC nail.NEU cutter.MASC
 b. kapnokalierjia < kapn- kalierjia
 tobacco-cultivation.FEM tobacco.MASC cultivation.FEM
 c. aetopetayma < aet- petayma
 eagle-flying.NEU eagle.MASC flying.NEU

Additional proof to the claim that gender assignment in Greek largely depends on morphological criteria also comes from terms marked by a high degree of familiarity. That familiarity plays an important role in the determination of gender was first observed by the Roman grammarian Varro who claimed that the more a referent is felt close to the speaker, the more necessary it becomes to create a formal pair that corresponds to the variation of sex. In fact, Greek provides formal pairs for terms denoting parenthood in the least costly way. That is as a two-way paradigmatic distinction in inflectional terms, and not by the use of additional lexical material as, in English, for example:

- (21)a. aδerfos / aδerfi
 brother / sister
 b. nonos / nona,
 godfather /godmother
 c. θios / θia
 uncle / aunt
 d. anips²os / anips²a
 nephew / niece
 e. kunjadōs / kunjada
 brother in law / sister in law

In (21), the same Greek stem assumes different inflected forms depending on whether it denotes a male (masculine) or a female (feminine) relative. As opposed to this, most of the

time English uses different words in order to express the two-way male/female distinction in both semantic and grammatical terms. This is what one should expect since English lacks - for the most part - grammatical gender.

Notice also that for the most familiar domestic animals, such as cats and dogs, gender variation corresponds to a three-way inflectional distinction (22) whereas for the rest of animals, grammatical gender is not predicted by sex variation and rather constitutes an intrinsic lexical feature of the noun (23):

- | | | | |
|--------|----------|---------|---------|
| (22)a. | γatos | γata | γati |
| | cat.MASC | cat.FEM | cat.NEU |
| b. | skilos | skila | skili |
| | dog.MASC | dog.FEM | dog.NEU |

- (23)a. tsakali
jackal.NEU
- b. tiγri
tiger.FEM
- b. likos
wolf.MASC

Although strongly motivated, the morphological approach fails, however, when it comes to nouns in -os belonging to the most common first inflection class (24).

- (24)a. eksodos
exit.FEM
- b. δromos
road.MASC
- c. γlosologyos
linguist.MASC/FEM

As illustrated in (24a,b,c), nouns of the first inflection class may be masculine as well as feminine. The same inflection class may also contain nouns denoting a profession, whose gender value is not clearly determined (24c).

2.4. Partial conclusions

To sum up, the determination of gender in Greek nouns seems to rely heavily on morphological criteria relevant to inflection, derivation and compounding, but, as argued in section 2.1, the role of semantics in gender determination is not superfluous since male humans are generally masculine, and female humans are feminine. However, as already tackled in section 2.3 (cf. (21)), a gender distinction that is triggered by sex only partially corresponds to a formal distinction. Moreover, as already seen in (24c) and further illustrated in (25), Greek nouns in -os whose semantic features are [human] and [profession] display the same inflected form for both masculine and feminine values:

- (25)a. jatros
doctor.MASC/FEM
- b. ipuryos
minister.MASC/FEM
- c. δiciyoros

lawyer.MASC/FEM

Originally, these nouns belonged to a purist language level i.e., to the so-called “katharevousa” (cf. Triantaphyllides 1953). Now, they are fully incorporated into the common use of language. What I would like to claim, is that nouns like the ones in (25) are underspecified with respect to gender and that this underspecification is resolved in syntax, through agreement with a related constituent (e.g., a noun) marked for a particular gender value:²¹

- (26) I Maria ine δiciyoros
 The.FEM Mary.FEM is lawyer
 “Mary is a lawyer”

This claim is in accordance with Setatos (1984) and Pavlidou (1985) who first observed that these nouns are ambiguous with respect to gender specification.

It should be noticed that professional nouns that are underspecified for particular gender values illustrate the crucial role of morphology in assigning gender, since derived formations are often produced as feminine counterparts. As (27) shows below, jatros ipuryos and δiciyoros give rise to the morphologically distinct feminine forms of jatrissa/jatrina, ipurjina and δiciyorina and respectively:

- (27)a. jatrissa/jatrina < jatr_{MASC/FEM} + issa/ina_{FEM}
 doctor.FEM
 b. ipurjina < ipury_{MASC/FEM} + ina_{FEM}
 minister.FEM
 c. δiciyorina < δiciyor_{MASC/FEM} + ina_{FEM}
 lawyer.FEM

As Pavlidou (1985, forthcoming) and Setatos (1998) have shown, the use of formations like those in (27) is not systematic and is often supported by extra-linguistic factors, such as the sex of the speaker, feministic attitude, and the general context of a particular situation. Socio-linguistic factors are also responsible for the fact that derived formations like voiθina “woman-assistant” (< voiθ(os) «assistant») are rarely used compared to formations like jatrina “woman-doctor”.

3. Gender representation and gender assignment

In order to represent gender and account for gender assignment in Greek, we will take advantage of the general guidelines of a generative morphology approach, as has been elaborated by Di Sciullo (1996) and Ralli (1997, 1999).

3.1. The framework

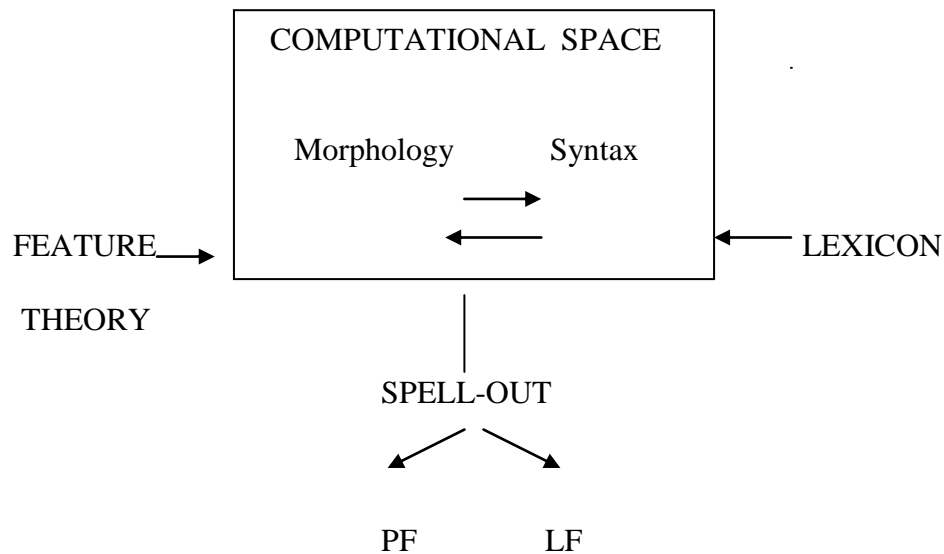
The basic assumptions of this approach are the following:

- a) Morphology is a grammatical module²² generating morphological expressions in the computational space of the faculty of language.
- b) A lexicon and the principles of a feature theory module feed both morphology and syntax.

The figure below, taken from Ralli (1999), gives a picture of the organization of the grammar developed on the basis of the above ideas.

Figure 1

The structure of Grammar



With respect to the role of the lexicon in grammatical operations, Jackendoff (1997:107) states that there could not be language without a lexicon, that is a list of the arbitrary matches between sound and meaning, since one of the hallmarks of language is the arbitrariness of the sign. Therefore, the computational system (morphology and syntax) must have an interface with a lexicon which, according to Ralli (1997, 1999), is morpheme-based, that is entries may be words (X^0), but also units smaller than words (i.e., stems, and affixes). Lexical entries are listed under the form of feature bundles representing phonological, morphological, syntactic and semantic information. They are inserted into morphological structures, subject to satisfying the constraints of selection and subcategorization (lexical constraints) as well as those imposed by the requirements of the morphological module.

The morphological part of the computational system constructs well-formed derivations in a sequence of steps, relating heads and non-heads. Each step is discrete. It has an input, which is the output of the previous step, and an output, which becomes the input to the next step. Outputs of morphological derivations need not be listed in the lexicon. They are not different from phrases in the sense that they are generated by productive rules and are part of a combinatorial system that applies within X^0 constituents.²³ Morphological structures are represented hierarchically. They derive according to the laws of the morphological module, some of which are also shared by the syntactic module (for similar points of view, see, among others, Selkirk 1982, Di Sciullo and Williams 1987, Di Sciullo 1996). The law of Relativized Head (cf. Di Sciullo and Williams 1987) accounts for the manipulation of featurized information in legitimate binary branching morphological structures, more particularly for the close relation between feature percolation and headedness. According to this law, there is only one head with respect to a feature F within a morphological object and it is the rightmost F -marked category in that expression.

Both the lexicon and the computational space of the grammar interact with a feature-theory module, the content of which provides a general framework to information manipulated by all components.

The feature theory that is assumed for the purposes of this paper considers features to be attribute-value pairs. This type of feature formulation is commonly used by unification-based

grammar formalisms and has been successfully implemented in several computational analyses of Greek Morphology.²⁴ It provides a better account of representing features than the one that proposes a choice between two polar qualities of the same category and usually uses a +/- representation system.²⁵ It displays the following advantages:

- a) It accounts for the fact that values like masculine, feminine and neuter belong to the same type of feature, that is, to gender.
- b) It admits more than one value to a specific attribute. Thus, an attribute is an atomic symbol and a value has either an atomic character or a multi-value one. As argued by Karttunen (1986) and Ralli (1997, 1999), a multi-value representation constitutes an efficient and economical way of representing features in morphologically rich languages.
- c) It allows values to be disjunctively specified. For example, the four-value case feature in Greek may be represented as in (28):

(28) [case:{nominative,genitive,accusative,vocative}].

Since one of the major characteristics of the process of inflection is variation of both form and meaning/function with respect to a given word, an advantage of accepting disjunctive values is that it captures the fact that the same inflectional affix may participate in more than one inflectional paradigm. It also accounts for the fact that the same affix may express various functions: see, for example, case syncretism, a phenomenon that is common in languages like Greek or Latin (see Ralli 1997, 1999 for more details on this).

- d) It provides a better way of handling underspecification than a +/- representation system does, since an underspecified feature X cannot be equal to the absence of feature X or to a minus value.

According to the value specification, features can be

- a) Specified
- b) Underspecified

In phonology, Archangeli (1988:189) has shown that underspecification is necessary in underlying representations, and may persist during the course of derivation. In what she calls radical underspecification, only unpredictable features are specified in the underlying representations. Predictable features are inserted in the course of derivation. If we apply a similar idea to morphology,²⁶ and to features seen as attribute-value pairs, we could claim that an underspecified feature is one that bears an attribute without a value, and that this value is acquired by some particular process. In other words, an underspecified feature is not absent, but has an empty value slot. On the contrary, a specified feature contains an attribute with an unpredictable value part.

Moreover, following Chomsky's (1995) distinction between intrinsic and optional features, we could assume that an intrinsic feature is a fixed property of lexical items. An optional feature, on the other hand, is a feature that gets added, modified, or further specified either in the course of a morphological process or in the course of a syntactic one. If we translate Chomsky's distinction of features into the framework that we adopt here, an intrinsic feature is a fully specified feature of lexical entries (e.g., of stems), while an optional feature may be an underspecified feature that gets its value by rule. This, in fact, does not contradict Chomsky's position since he admits that the term "optional" refers only to the value of the feature, not to the feature itself, the presence of which is stipulated by general principles.

Regularities between features within a specific domain are expressed by several feature co-occurrence specification rules, the general idea of which relies in the work by Gazdar, Klein, Pullum and Sag (1985) within the framework of Generalized Phrase Structure Syntax. Such rules have been proposed in the past by Farkas (1990) and Harris (1991, 1992) for

gender in Rumanian and Spanish respectively. In fact, as seen below, several correspondences exist between the values of gender and those of inflection class in Greek nouns. Feature co-occurrence specification rules act as feature-filling rules and apply to items that are not lexically specified for these feature values. They also capture the notion of the default value by expressing connections between values of co-occurring features.

3.2. The gender feature in nouns

Assuming a framework where only unpredictable information should be listed in the lexicon (see above and Chomsky 1995), gender determination and/or gender assignment in Greek nouns are accounted for as follows.

3.2.1. Gender as an intrinsic feature

Following the theoretical assumptions in 3.1, the gender value of an item that is not predicted by other features, or is not derived by rule, constitutes an intrinsic lexical feature of the item's entry. As shown below, in a morpheme-based lexicon containing both stems and affixes, a fully specified gender feature belongs to the intrinsic features of nominal stems. Consider nouns like those in (29).

- (29)a. kīpos
garden.MASC.IC1
b. proōdos
progress.FEM.IC1

Their gender value is not triggered by semantic information, and is not motivated by morphology, that is by the inflection class these items belong to. As shown in section 2, the gender value of items that are not humans is not predicted by any sex distinctions, and there is no one-to-one correspondence between gender and inflection class, since items of different gender values may belong to the same inflectional paradigm (29a,b). Since neither semantics nor morphology is responsible for the particular gender values, nouns like the ones above should bear an intrinsic fully specified gender feature. Notice, however, that these items are inflected, that is they contain a stem and an inflectional affix. The question is whether both the stem and the affix are lexically marked for a gender value or one of the two morphemes. I would like to propose that the gender feature is a property of stems and not a property of inflectional affixes. Since the same inflectional affix may be added to stems of different gender values, as illustrated by the examples in (7) and (29), there is no reason why gender should be a feature characterizing inflectional affixes (see also section 3.2.2). Thus the stem entries of the examples like those in (29) should be lexically marked as follows:

- (30)a. kip [gd:masc]
b. proōd [gd:fem]

3.2.2. Gender as an optional feature

There are cases, however, where the gender value of an item is predicted by another co-occurring feature. As already observed, in some nouns, a specific gender value is triggered by the semantic feature [human] and a [male/female] sex distinction (see 2.1.). It is worth noticing that what is predicted is only the particular value of the feature, not the entire feature itself, being an attribute-value pair. The gender feature is an inherent specification of noun stems and what is provided by other featurized information is the instantiation of this feature, that is its particular value.

According to the theoretical approach assumed here, the above observations translate into the following:

- a) noun stems bear a gender feature as an attribute-value pair, as in [gd:X].
- b) Stems whose gender value does not derive on the basis of other information contain a fully specified attribute-value pair (see (30)).
- c) Stems whose gender value is derivable contain an underspecified gender feature, that is a feature whose attribute has no value part, as in [gd:]. A particular value is assigned by rules that take into consideration information that is responsible for filling the missing value. For example, where gender assignment depends on the existence of other semantic features, this rule is a feature-co-occurrence specification rule of the following type.

(31)a. sex:male → gd:masc²⁷
 type:human
 gd:

b. sex:female → gd:fem
 type:human
 gd:

Remember now that there are also nouns where the morphological feature of inflection class is responsible for their gender specification, as claimed in section 2.3 and further illustrated in (32).

- (32)a. nikociri(s)²⁸
 landlord.MASC
- b. pinaka(s)
 blackboard.MASC
- c. avli
 yard.FEM
- d. porta
 door.FEM
- e. para·ir(o)
 window.NEU
- f. tavani
 ceiling.NEU
- g. soma
 body.NEU
- h. pelay(os)
 open-sea.NEU

As seen in the previous case, gender-value assignment to these stems should also occur by the application of a feature-co-occurrence specification rule, this time by a rule involving morphological information:²⁹

(33)a. ic:2 → gd:masc
 gd:

b. ic:3,4 → gd:fem³⁰
 gd:

c. ic:5,6,7,8 → gd:neu
gd:

At this point, a further clarification is needed with respect to the question of why it is the stem, and not the inflectional suffix, that gets specified for a particular gender value, since both the stem and the inflectional suffix contain the inflection-class information that is crucial to the gender-value assignment. As seen in section 3.2.1, only stems could bear specific gender information because the same inflectional affixes may be added to stems of different gender values. It is also the case that the same inflectional affix could appear in more than one inflectional paradigm. For instance, the inflectional suffix –os, expressing the values of nominative and singular, appears in two different paradigms, those of IC1 (e.g., anθropos “man”) and IC7 (e.g., kratos “state”), as seen in the Appendix. Were the inflectional suffix –os responsible for the specification of the gender feature, inflected forms such as anθropos and kratos would indiscriminately be specified as masculine or neuter. This is not what happens since the form anθropos is only masculine and kratos only neuter. Therefore, gender is a feature that comes from the stem and not from the inflectional affix.

3.2.3. Conflicting-rule applications

In the last paragraph, an account is offered of how a specific value is provided to an underspecified gender-slot of a particular noun stem. It has been claimed that different co-occurrence specification rules assume this value-filling role, that is rules that involve mainly semantic or morphological information. What happens though when there is a conflict in the application of these rules? For example, what is the rule that precedes, and possibly blocks, the application of another rule? Greek provides evidence that when there is a conflict between a semantically-driven gender assignment and a morphologically determined one, the second takes precedence over the first. In fact, this is what follows by assuming Panini’s principle (formulated by Kiparsky (1982) as the *Elsewhere Condition* for the application of phonological rules), according to which, in situations where there are conflicting applications of rules and principles, rules and principles involving specific information precede those involving more general information. In our case, the semantic sex restrictions could be considered to be more general than the restrictions imposed by the morphological feature of inflection class: the semantic restrictions apply to males and females while the latter refer to specific forms of nouns. As an illustration, let us consider the words pedi “child.NEU”, koritsi “girl.NEU” and ayori “boy.NEU” which are apparent counter-examples to the application of the rules listed in (31) since they are marked as neuter in spite of the fact that their sex value is male or female. The stems of these nouns belong to the sixth inflection class (IC6).³¹ As such, they are subject to the morphologically-driven gender-value assignment that results from the application of the rules given in (33). In accordance with Panini’s principle, a more specific rule application, that is a morphologically-based rule, blocks the application of the more general feature co-occurrence specification rules listed in (31).

3.2.4. Cases of persisting underspecification

Cases considered so far illustrate how feature underspecification is resolved in the lexicon. Feature underspecification may persist though until a full-word form has reached syntax. Consider nouns denoting a human profession that display the same form for both masculine and feminine values (see examples in (25)). The stems of these nouns are underspecified with respect to a particular gender value. For example, the stem of a noun like ipury-os “minister” may be used both as masculine or feminine. As argued in section 3.1, the feature approach that is followed in this paper allows us to express underspecification by representing the attribute of gender without any specific value, i.e., as [gd:]. Underspecification is not resolved by the

application of a feature-co-occurrence restriction rule referring to either semantic information (a minister can be both male and female) or to inflection class, since these items inflect according to the first declension that contains both masculine and feminine nouns. In addition, no gender value comes from the set of the inflectional affixes combined with the stem, since, as shown in 3.2.1 and 3.2.2, inflectional affixes bear no gender features. Therefore, gender underspecification of these items is resolved at the phrasal level, that is through agreement with an item marked for a particular gender value (e.g., a determiner).³²

- (34)a. \bar{o} *ipuryos*
 the.MASC minister
 b. *i* *ipuryos*
 the.FEM minister

It should be noticed that the examples of persisting underspecification that are examined in this section argue in favor of the approach that considers features to be attribute-value pairs: a noun with a gender attribute without a particular value (e.g., *ipuryos*) can combine and agree with an item marked for a specific value (e.g., the determiner \bar{o}) since both items contain a gender feature. Agreement between a noun and a determiner would not have been possible if nouns like *ipuryos* did not have a gender feature.

3.2.5. Gender assignment in word formation

The cases examined so far concern gender as a stem specification. As shown in the second section though, there are cases where the presence of gender in a word form, that is, in a form produced by morphology, is due to the intervention of word-formation processes.³³ Let us repeat for expository purposes that the processes of derivation and compounding, interacting with the principles of headedness and percolation, are responsible for assigning gender to word forms. For example, a right-headed compound like *anθocipos* “flower garden” (35) inherits its masculine value by feature percolation that transmits the masculine value from the head constituent *cip-* to the compound node.

- (35) *anθocipos*³⁴ [gd:masc]
 / \
 anθocip [gd:masc] os
 / \
 anθ [gd:neu] cip [gd:masc]

Stems are not the only entries marked for gender, though. In the approach described in 3.1, derivational affixes are also specified for a gender feature. That is why in a derived word like *cipaci* “little garden” (see (36)) the derived item acquires a neuter value from its head, i.e., the derivational diminutive suffix *-aci*. In (36), feature percolation that firstly looks at heads, transmits the neuter value to the derived form *cipaci* and ignores the masculine feature of the non-head *cip-*.

- (36) *cipaci* [gd:neu]
 / \
 cip [gd:masc] aci [gd:neu]

It should be noticed that beside the forms given in (34), there are also Greek nouns expressing a profession that display a form variation according to the gender value they assume:

- | | |
|----------------------|---------------------|
| (37)a. taksidzis | b. taksidzu |
| taxi-driver.MASC.IC2 | taxi-driver.FEM.IC3 |
| γalatas | γalatu |
| milk-man.MASC.IC2 | milk-woman.FEM.IC3 |

It is important to point out that the nouns in (37) constitute derived formations and acquire their [profession] feature by the derivational suffixes –dzi(s), –dzu, –a(s) and –u that are added to the stems taksi- and γalat- respectively:

- | | |
|------------------------------|-------------------------|
| (38)a. [[[taksi] –dzi] –s] | b. [[[taksi]-dzu] -∅] |
| [[[γalat]-a]-s] | [[[γalat]-u] -∅] |

The same affixes are also marked for particular inflection class values: –dzi(s) and –a(s) are marked for [ic:2] and –dzu and –u for [ic:3]. Since derivational suffixes are heads of their structures, these values, together with the [profession] feature, percolate to the derived items of taksidzi- / taksidzu- and γalata- / γalatu- and trigger an application of the value-filling rules listed in (33). According to these rules, a masculine value is assigned to (38a) and the feminine value to (38b). That is why the inflected form of professional nouns in –dzi(s) and –a(s) are always masculine, while nouns in –dzu and –u are feminine.

As far as inflection is concerned, it also plays a role in gender assignment. In spite of the fact that inflectional affixes do not carry any gender information, and in inflected words, specific gender values are inherited from stems (39) or derivational affixes (36), it has been shown above (see (33)) that in most cases, gender values depend on inflection class, a feature closely related to inflection.

- | |
|-----------------------------|
| (39)a. cipos [gd:masc] |
| / \
cip[gd:masc] os |

In section 1.2, an important question was raised with respect to the nature of the feature of gender. It was argued that gender is a lexical feature, in the sense that it characterizes lexical items, independently of whether they are derived, non-derived, inflected or non-inflected. In fact, in the last sections, it has been shown that gender is not a feature participating in a specific process relevant only to inflection or to derivation. Gender is a feature that inherently characterizes lexical entries, that is stems and derivational affixes. As such, it participates in the word-formation processes where these entries are involved, that is, in compounding, derivation and inflection, without being specifically related to anyone of these processes.

3.2.6. Gender assignment in nouns with variable endings

A final stage, in this study, concerns gender specification in nouns like the ones listed in (21), i.e., in items marked by a high degree of familiarity and displaying variable endings according to a particular gender value.

As a first remark, we can say that these nouns vary only with respect to the masculine and feminine values, the neuter value being absent. This absence is semantically predicted, i.e., by the semantic feature co-occurrence specification rules, given in (31), where only masculine and feminine values are allowed by humans, that is by males and females respectively. However, a clear distinction between the male and the female value at the stem level is not

possible because the stems of these items are underspecified with respect to sex, that is they contain the sex attribute without a specific content:

(40) sex:³⁵

The missing sex value renders impossible an application of the rules in (31), as feature-filling processes, where a male or a female value triggers the masculine or the feminine value respectively.

As shown in (41b) below, for nouns that are usually used to express the feminine value, there is an allomorphic variation between a stem of a X variant in the context of plural and a stem of a variant X(a) in the context of singular.³⁶ On the contrary, allomorphy is absent from nouns expressing the masculine value (41a):

(42)a. non-os-NOM.SG / non-i-NOM/VOC.PL
 non-u-GEN.SG non-on-GEN.PL
 non-o-ACC.SG non-us-ACC.PL
 non-e-VOC.SG
 “godfather”

b. nona-∅-NOM/ACC/VOC.SG / non-es-NOM/ACC/VOC.PL
 nona-s-GEN.SG non-on-GEN.PL
 “godmother”

In order to account for this peculiarity, I would like to propose that there are two different stems: a stem that is lexically marked for the inflection-class value 1 (e.g., non- “godfather”), and a stem with an allomorphic variation (see (42)) that is marked for the third inflection class (e.g., nona- “godmother”).

(42) Stem allomorphs listed in the lexicon:

X	~	X(a)
type:human		type:human
sex:		sex:
familiar:yes		familiar:yes
ic:3		ic:3
gd:		gd:

Following the feature co-occurrence specification rule given in (33b), and repeated as (43) for expository purposes, specific information concerning the feature of inflection class may act as a feature-filling process. That is the lexical marking for the third inflection class triggers the feminine value to the underspecified gender slot of the stem:

(43) ic:3,4 → gd:fem
 gd:

Therefore, in nouns denoting familiarity, gender specification is partially fulfilled by morphology, that is by information regarding the inflectional paradigm the stem belongs to. However, this gender-value specification does not affect the stem that shows no allomorphic variation. For example, non- “godfather” is still underspecified. What I would further propose is that this stem is assigned a masculine value by default, since this is the only value that

remains to be assigned given the requirements imposed by semantics, according to which a male or a female human can be masculine or feminine accordingly.

(44) gd: → gd:masc

4. Summary

This paper dealt with the role of morphology in determining gender in Greek nouns and the contribution of feature theory in its representation. It was shown that, while the role of semantics is crucial in determining particular gender values, gender assignment depends mainly on morphological information. Following a feature-based approach, it was argued that gender is an intrinsic property of lexical entries, namely of noun stems and derivational affixes. Considering features to be attribute-value pairs, entries were distinguished into two types: these characterized by a fully specified gender feature, that is by a feature containing an attribute with a specific value part, and those that bear an underspecified gender feature, that is an attribute without a value. It was proposed that the latter acquire the missing value either by some feature co-occurrence specification rules relating co-occurring features of the same lexical entry, or by some other device operating outside morphology (e.g., agreement in syntax). Finally, with respect to the nature of gender, it was shown that, without being specific to a particular process, gender is a lexical feature that actively participates in word-formation processes, as well as in agreement in syntax.

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APPENDIX

A. Glossary for terms

gd=gender
 MASC=masculine,
 FEM=feminine,
 NEU=neuter,
 NOM=nominative,
 GEN=genitive,
 ACC=accusative
 VOC=vocative
 SG=singular,
 PL=plural
 IC=inflection class

B. Inflection Classes

In the examples given below, inflectional affixes are separated from stems with a hyphen and the “~” symbol relates allomorphs of the same stem entry.

IC1. Examples of stems: anθrop “man.MASC”
 psif “vote.FEM”

	SG	PL
NOM	anθrop-os	anθrop-i
GEN	anθropu	anθrop-on
ACC	anθrop-o(n)	anθrop-us
VOC	anθrop-e	anθrop-i

IC2. Examples of stems: tamia ~ tami “cahier”
 (all masculine) papaδ ~ papa “priest”
 ma²iti ~ ma²it “fighter”
 bakaliδ ~ bakali “grocer”
 kafeδ ~ kafe “coffee”
 papuδ ~ papu “grandfather”

	SG		PL	
NOM	tamia-s	kafe-s	tami-es	kafeδ-es
GEN	tamia	kafe	tami-on	kafeδ-on
ACC	tamia	kafe	tami-es	kafeδ-es
VOC	tamia	kafe	tami-es	kafeδ-es

IC3. Examples of stems: mitera ~ miter “mother”
 (all feminine) avli ~ avl “yard”
 alepuδ ~ alepu “fox”

	SG		PL	
NOM	mitera	alepu	miter-es	alepuδ-es
GEN	mitera-s	alepu-s	miter-on	alepuδ-on
ACC	mitera	alepu	miter-es	alepuδ-es
VOC	mitera	alepu	miter-es	alepuδ-es

IC4. Example of stems: poli ~ pole “city”
 (all feminine)

	SG	PL
NOM	poli	poli-s
GEN	poli-s / pole-os	pole-on
ACC	poli	poli-s
VOC	poli	poli-s

ICs5 Examples of stems: vun “mountain”
6 spiti “house”
7 krat “state”
8 somat ~ soma “body”
 (all neuter)

	SG			
NOM	vun-o	spiti	krat-os	soma
GEN	vun-u	spiti-u	krat-us	somat-os
ACC	vun-o	spiti	krat-os	soma
VOC	vun-o	spiti	krat-os	soma

	PL			
NOM	vun-a	spiti-a	krat-i	somat-a

GEN	vun-on	spiti-on	krat-on	somat-on
ACC	vun-a	spiti-a	krat-i	somat-a
VOC	vun-a	spiti-a	krat-i	somat-a

Endnotes

*Preliminary versions of this paper have been presented at the 4th International Meeting of Greek Linguistics (University of Cyprus, September 1999), at the Vienna Morphology Meeting (February 2000), and at A.M. Di Sciullo's Asymmetry Research Group (UQAM, December 1999). Parts of the paper appear in the Proceedings of the 4th International Meeting of Greek Linguistics (2000, title: Gender in Greek Nouns). My sincerest thanks to the audiences of the meetings for their constructive observations. I am most grateful to A. Anastassiadi-Symeonidi, G. Booij, D. Cheila-Markopoulou, G. Corbett, Th. Pavlidou, E. Tiffou, and two anonymous reviewers for their most precious comments on an earlier draft of the paper.

¹Greek words are given in a broad phonetic transcription according to the characters of the International Phonetic Alphabet. Stress is omitted from all the examples because it is not relevant to the issues dealt in the paper.

²As seen below, nominal endings are treated as affixes that are listed in a morpheme-based lexicon.

³See also Spencer (1999:38) who notes that there are two aspects to gender. On the one hand, it is an inherent property of nouns, associated with its meaning, and its phonological form, or simply an arbitrary lexical property. On the other hand, the gender of a predicative expression (e.g., an adjective) is defined by the agreement patterns which the expression manifests with the noun controller.

In this paper, I restrict my attention to nouns taken in isolation, and touch only slightly the notion of agreement (see paragraphs 1.2, 2.4, and 3.2.4). My concern is firstly to explain to what extent gender is assigned to nouns, or is arbitrarily specific to them, and secondly to provide a solid account for its representation. Since gender in Greek adjectives requires a thorough analysis of questions related to agreement, adjectives and nouns that are converted adjectives (or are closely related to them e.g., *asθενis* "sick") are excluded from this work.

⁴A more or less similar situation occurs in a language like Italian where the overtly expressed masculine and feminine values trigger different endings. See Di Domenico (1997) for a syntactically-based analysis of gender variation in Italian nouns.

- | | | |
|-------|----------------|------------------|
| (i)a. | ragazzo | ragazza |
| | "boy" | "girl" |
| | b. maestro | maestra |
| | "male teacher" | "female teacher" |

⁵Gender in animals, birds, reptiles, insects and fish is usually unpredictable, and, thus, an intricate subject to investigate. Gender variation, however, may occur in some domestic animals. See 2.3 for more details on this.

⁶Sets of similar pairs are also found in other languages:

- | | |
|--------|--------------------------|
| (ii)a. | English: lion / lioness |
| | b. Russian: lev / l'vica |
| | "lion" "lioness" |

(cf. Corbett 1991 and Spencer 1999).

⁷It should be noticed that originally, feminine nouns like the one in (6b) ending in *-os* in the nominative singular form, were used by the literary-style of language, the so-called "katharevousa". However, today, they are fully incorporated in the common vocabulary,

participate in word formation (e.g., compounding), and constitute a productive type of noun formation in scientific terminology.

⁸For a detailed discussion of gender and its distinctiveness from inflection class, see also Aronoff (1992, 1994) and Ralli (1998, 1999) as far as Greek is concerned.

⁹As shown by Ralli (1994, 2000a), Greek nouns are inflected according to eight inflection classes. See the Appendix for relevant examples and a general classification of noun inflection classes. For reasons of clarity, some of the inflectional paradigms given in the appendix are repeated under (7) and (8).

¹⁰The same type of cases is also encountered in a language like Latin:

(iii)a. 5th declension

dies.MASC.NOM.SG, diei.MASC.GEN.SG “day”,

res.FEM.NOM.SG, rei.FEM.GEN.SG “thing”

b. 4th declension

Exercitus.MASC.NOM.SG, exercitus.MASC.GEN.SG “army”,

Sensus.FEM.NOM.SG, sensus.FEM.GEN.SG “feeling”.

¹¹Aronoff (1992, 1994) points out that agreement in Arapesh (a language of the Torricelli family spoken near the north coast of Papua New Guinea) also involves a distinction between class and gender. The noun passes on its gender, but never its morphological class.

¹²Any attempt to relate the feature of animateness with gender finds diachronic support from what Meillet (1931) has observed about the genesis of gender in Indo-European. As shown in sections 2.1 and 2.3, however, the fact that gender marking is generally unpredictable for animals, leads us to conclude that a more specific feature, i.e., [human], is needed for the semantic determination of gender in Greek. About the relation between gender and animateness, see also Haudry (1979).

¹³Syntactic agreement may be another formal factor of gender assignment, but is different from the factors involving morphology and phonology. It is syntactic agreement that tells us what gender an agreeing word is, but for the speaker, it is necessary to know the gender of the basis in order to produce the agreement. As suggested by Corbett (personal communication), morphology and phonology may be the possible factors in gender assignment, but not syntax.

¹⁴As Corbett (1991:31-40) remarks, people tend to confuse the declension types (inflection classes) with the nominative endings in most Indo-European languages.

¹⁵As seen in the appendix, stems of nouns such as *tiēi* “chance” and *floya* “flame” belonging to the third inflection class have two allomorphic variants, one ending in a vowel and another ending in a consonant.

¹⁶According to Ralli (1994, 2000a), while adjectives generally share the inflectional patterns of nouns, two additional inflection classes, IC9 and IC10, characterize adjectives of “learned”, Ancient Greek origin (iva) and certain adjectival exocentric compounds (ivb):

(iv)a. *evjenis*

polite.MASC/FEM

b. *oliyomelis*

few-membered.MASC/FEM

evjenes

polite.NEU

oliyomeles

few-membered.NEU

¹⁷For reasons of clarity, no separation is made between the derivational affixes and their inflectional part.

¹⁸The stem of the verb “to wear” has two allomorphs, *for-* and *fore-*, depending on the context into which they appear. *Fore-* is the stem allomorph that is generally used for derived nominals and for verbal forms marked as perfective. See Ralli (1988) for more details on verbal allomorphy.

¹⁹Notice that headedness and percolation are responsible for transmitting the gender value of the right-hand member to the compound word only in endocentric compounds like the ones listed under (20). There are exocentric compounds, however, where a particular gender value may be determined by the compounding process itself. See, for instance, an example like misojinis “who hates women”, built on the basis of a verbal stem *mis-* “hate” and a noun stem *jini-* “woman”. In this compound, the right-hand constituent *jini-* is feminine, but the compound word is masculine. The same phenomenon applies to other languages too. For example, French exocentric compounds, like porte-monnaie “wallet” are masculine, in spite of the fact that the noun right-hand constituent has a different gender value (e.g., monnaie “coin” is feminine).

²⁰The *-o-* appearing between the compound constituents is a linking vowel. See Ralli (1992) for an analysis of linking vowels in Greek compounds.

²¹The problem regarding how it is technically achieved goes beyond the scope of this paper. See also section 3.2.4.

²²About morphology seen as an autonomous level of grammar, see also Aronoff (1994:63) who claims that morphology is not entirely reducible to another level, and follows principles of its own, in addition to other principles that may apply to other levels as well.

²³Jackendoff (1997:117) shares similar views with respect to the existence of productive lexical rules applying within X^0 constituents.

²⁴See, for example, Markopoulos (1998) and Ralli (2000b) for a computational analysis of Greek inflection where morphosyntactic information is handled with the use of features represented as attribute-value pairs.

²⁵Among the authors who argue against feature binarity, see Karttunen (1986), Van der Hulst and Smith (1986) and Rooryck (1994). In theoretical morphology, features seen as attribute-value pairs have been used by Steele (1995).

²⁶As a matter of fact, Rooryck (1994) has shown that the notion of underspecification is neither phonology nor syntax specific, and that it should be viewed as an independent module of feature representation in the language faculty that is accessible to both syntax/morphology and phonology.

²⁷In feature bundles, the order between features is not important.

²⁸Inflectional affixes are put in parentheses. Absence of parentheses (cf. (34c,d,f,g)) denotes the presence of zero inflectional affixes following the stems.

²⁹The close relation between inflection class and gender in morphologically rich languages has already been pointed out by Corbett (1991) and Aronoff (1994), but has not been technically elaborated in terms of a relation between co-occurring features of the same feature matrix. As opposed to the analysis here, where the feature of inflection class triggers particular gender values, Aronoff (1994:68-72) considers gender to trigger the application of realization rules that are responsible for assigning inflection class to nouns.

³⁰As mentioned in 3.1 and proposed by Ralli (1997, 1998, 1999), the content of an attribute may contain values disjunctively specified. This allows us to account for the fact that a feature may contain more than two values. In fact, as seen in section 1.4 and the Appendix, the inflection-class feature contains up to 8 values in Greek nouns.

³¹It should be noticed that according to Ralli (1994, 2000a), the stems of these neuter nouns include the full form in *-i*. They are fully specified for an IC6 feature, and become inflected words, within morphology, after their combination with zero inflectional affixes representing relevant case/number information. See the Appendix for a clear picture of the inflectional paradigm of these nouns.

³²It is beyond of the scope of this paper to show how resolution of underspecification can be technically achieved through agreement in a unification-based formalism that uses features as attribute-value pairs. For the role of the agreement, see also section 1.2.

³³That gender is determined by derivational morphology which makes use of gender information listed in the entry of the affix is also a case for Russian or German, as shown by Corbett (1991:50).

³⁴As shown by Ralli (1992), compounds like anθokipos are [stem-stem], that is compounding occurs before the addition of the inflectional suffix –os.

³⁵An absence of a particular sex value is also observed in nouns denoting a profession that do not contain variable endings, e.g., γλωσολογος “linguist”. As shown in 3.2.4, gender specification of these nouns is achieved at the phrasal level

³⁶As seen in (21), there are also nouns in the familiarity domain where the feminine value is expressed by a stem allomorph of an X(i) type (e.g., aδerfi “sister”, aδerf-es “sisters”).