Referential agreement in Modern Greek coordinate nouns

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Abstract: In most languages, gender agreement in predicate argument coordinate nouns can be either syntactic or semantic. In Modern Greek (MG), the analysis of the data showed that a third type of gender agreement is also found motivated by a contextually referred noun and known as referential agreement. This type of agreement occurs in specific discourse conditions where native speakers bring into the context an implied noun and the predicative adjective/participle agrees with the agreement features of that noun. The analysis of the present phenomenon could be viewed from an ontological perspective.
Key words: syntactic agreement, semantic agreement, contextually referred noun, referential agreement

1. Introduction

Corbett 1991 discussed the phenomenon of resolution in *gender*, *number* and *person*[1] features in coordinate nouns. With regard to *gender* resolution, Corbett 1991 argues that there are two types of resolution the syntactic and the semantic. Syntactic gender resolution means that "the gender of the conjoined nouns involved is what counts rather than their meaning (Corbett 1991: 279). Some characteristic examples are found in languages such as Latin, French, Spanish, Latvian, Hindi and Modern Hebrew. In Latin, a language with three genders, masculine, feminine and neuter, syntactic resolution occurs in mixed gender, inanimate nouns, as seen below:

(1a)   murus et porta de caelo tact-a erant
         wall.*masc.sg* and gate.*fem.sg* from sky struck.*neut.pl* were
         'The wall and the gate have been struck by lightning'
         (Corbett 1991: 287)

On the other hand, semantic gender resolution "involves reference to the meaning of the conjoined elements even if this implies disregard for their syntactic gender" (Corbett 1991: 269). This means that the inherited meaning of the conjuncts determines the resolution result and not the grammatical gender. Some examples of semantic resolution are found in Dravidian and Bantu languages and in some European ones. In French, for example, a language with two genders, masculine and feminine, animate mixed gender conjuncts show semantic resolution and resolve to masculine. The following example illustrates the above:

(1b)   un père et une mère excellents
         a..*masc.sg* father.*masc.sg* and a..*fem.sg* mother.*fem.sg* excellent.*masc.pl*
         'a father and a mother excellent'

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[1] *Number* and *person* features will not be discussed in the current paper.

The paper is organized as follows. In the first part, we will present two central theories that have been developed within Lexical Functional Grammar (LFG), using a set-based approach. The second part presents a number of MG data which show cases of semantic resolution in animate nouns and syntactic resolution in inanimate nouns. The third part deals with some unexpected patterns that do not fall into any of these two categories and they are cases of referential resolution. In the last part, we will discuss briefly how referential agreement works in MG and whether the same phenomenon is found in other languages. The present phenomenon is explained in terms of an ontological perspective but further research is required to establish that.

2. Theories in Gender Resolution
Two central theories have been developed in gender resolution within LFG, a purely syntactic account developed by Dalrymple & Kaplan 2000, and a syntactic-semantic account developed by Wechsler & Zlatić 2003.

The central problem behind resolution has been the different agreement features of the coordinate phrase from the features of the individual conjuncts. A characteristic example is shown below where the conjuncts are masculine and feminine and the coordinate phrase as a whole is masculine:

(2a)   O Kostas ke i Maria ine xarumeni
        the.*masc.sg* Kostas.*masc.sg* and the.*fem.sg* Maria.*fem.sg* are happy.*masc.sg*
        'Kostas and Maria are happy'

To account for this phenomenon, Dalrymple & Kaplan 2000 use the set-based theory and treat GENDER as a set-valued feature rather than an atomic feature, asserting that "sets encode complex values" (Dalrymple & Kaplan 2000: 780). They assign set values to the different genders, masculine, feminine and neuter. In French, for example, the masculine gender is represented with the empty set {} and the feminine is represented with the set {F}. Once the sets are assigned to the features of individual conjuncts, the resolved feature value of the coordinate phrase is the set of the UNION of the values of the conjunct daughters. The UNION operator constructs the smallest set and ensures that all the members of the input set are included within that. Dalrymple and Kaplan 2000 use a formal way to state the condition of the smallest set:

(2b) $x \cup y$ is the smallest set z such that $x \subseteq z \wedge y \subseteq z$
        (Dalrymple & Kaplan 2000: 785)

The above states that "the union will result if we take the SMALLEST set that satisfies a collection of separately stated MOTHER-DAUGHTER SUBSET assertions" (Dalrymple and Kaplan 2000: 785). Thus, syntactic resolution reduces to the simple operation of set union. LFG as a framework has the flexibility to capture the SMALLEST SET function and the MOTHER-DAUGHTER SUBSET relation using the metavariables ↑ and ↓. The annotated PS rule is introduced as follows:

(2c)   NP →   NP   CONJ   NP
                ↑∈↓   ↑∈↓
        (↓GENDER) ⊆ (↑GENDER) (↓GENDER) ⊆ (↑GENDER)
        (Dalrymple & Kaplan 2000: 788)

A characteristic example is Hindi, a language with two genders, masculine and feminine. The agreement patterns of Hindi are below:

(2d)   Hindi
        MASC & MASC = MASC
        MASC & FEM = MASC
        FEM & FEM = FEM
        (Dalrymple & Kaplan 2000: 789)

Gender resolution is calculated by assigning the relevant sets and using the union operation to derive the gender feature of the coordinate phrase:

Masculine: {M}
Feminine: { }

(2e)   Hindi
        {M}(MASC) ∪ {M}(MASC) = {M}(MASC)
        {M}(MASC) ∪ {} (FEM) = {M}(MASC)
        {}(FEM) ∪ {} (FEM) = {} (FEM)
        (Dalrymple & Kaplan 2000: 789)

The results of the UNION operation give the desired agreement patterns.

Wechsler & Zlatić's 2003 also use a constraint-based formalism and present a combination of a semantic account for animate coordinate nouns and a syntactic account for inanimate coordinate nouns. They focus on languages like French, Serbian/Croatian and Icelandic. In Serbian/Croatian, for example, animate nouns with a feminine and a neuter noun with a female referent resolve to feminine[2]:

(2f)   Serbian/Croatian
        Ova   velika   devojka i   moje   malo   devojče su
        this.*fem.sg*   big.*fem.sg* girl.*fem.sg* and my.*neut.sg* little.*neut.sg* girl.*neut.sg*
        se   lepo   igrale./?igrali
        AUX.PL REFL WELL played.*fem.sg*
        'This big girl(F) and my little girl(N) played well'
        (Wechsler & Zlatić 2003: 150).

The above pattern shows that animate nouns resolve according to the semantic principle and inanimate nouns follow the syntactic one.

Wechsler & Zlatić 2003 propose a set-based account for both groups of nouns. They propose that animate nouns have semantic correlates, meaning that masculine gender correlates with male sex and feminine gender with female sex. An NP is assigned either a grammatical gender or a semantic gender. The former is assigned to a non-coordinate NP which inherits its features from the head based on the head feature sharing mechanism. The latter is assigned to NPs in two different cases: in lexically genderless head nouns, such as sex-neutral nouns or proper nouns, and in coordinate NPs which lack a head noun and therefore a grammatical gender feature. Wechsler & Zlatić's 2003 impose the following generalisation:

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[2] For more examples on languages like French, Icelandic and Serbian/Croatian see pages 148-150.

Gender agreement with an animate NP that lacks inherent (grammatical) gender is always interpreted semantically (Wechsler & Zlatić 2003: 150).

For languages like French, Serbian/Croatian and Icelandic, they derive the resolution facts semantically by proposing two types of genders, the s(emantic)-genders with semantic correlates, such as masculine and feminine and those without semantic correlates, such as neuter, referred to as e(mpty/expletive)-genders. The s-genders have the following correspondence:

(2g)   Semantic interpretation for s-genders:
        a. feminine: 'female'
        b. masculine: 'non-female'

This distinction is based on the notion that sex is a distributive property. Thus, 'female' is a group with female members only whereas 'non-female' is a group either with male members only or a mixed group with at least one female member.

    Using the set-intersection operation and assigning the relevant sets to each member of the coordinate phrase, they derive the desired results. For example, the masculine noun 'Jean' is assigned the set {} and the feminine noun 'Marie' is assigned the set {female}, the intersection of the two {female} $\cap$ {} = {} results into a non-female group as required with at least one non-female member. Grammatical agreement is also assigned when semantic agreement does not take place in animate nouns.

    For inanimate nouns, Wechsler & Zlatić 2003 introduce a rule according to which they derive the gender of the coordinate inanimate nouns by intersecting the semantically interpretable genders (usually masculine and feminine) with genders of the inanimate nouns which are represented as null or unary sets:

DR. [{ [GEND $\gamma 1$], … [GEND γ^n], }] $\Leftrightarrow$ D.R. [[GEND $\gamma 1$] $\cap$ …$\cap$ γ^n $\cap$ Gs] where $\gamma 1$ … γ^n are null or unary sets representing the respective genders of the   inanimate discourse referents and Gs is the set of s-gender features in the grammar (Wechsler & Zlatić 2003: 152).

(2h)   French
        a. *Set of s-gender features:* Gs = {F}

        b. *Set representation of the genders:* FEM:{F} ('female')
                                                MASC:{ } ('non-female')

        c. *Calculating the gender for plural referents using the above rule:*
        MASC & MASC =MASC   { } $\cap$ { } $\cap$ Gs = { }
        FEM & FEM = FEM   {F} $\cap$ {F} $\cap$ Gs = {F}
        MASC & FEM = MASC   { } $\cap$ {F} $\cap$ Gs = { }
        (Wechsler & Zlatić, 2003: 185)

The above rule applies both to coordinate phrases and to aggregate discourse referents.

    Wechsler & Zlatić 2003 propose an analysis couched in LFG. They introduce two types of equations *defining equations* for the semantic gender and *constraining equations* for the grammatical gender. For example, the adjective below specifies disjunctively two values for the GEND feature, the semantic value 'female' and the grammatical value {F}:

(2i)   competente, A
         (↑PRED) = 'competente ‹(↑SUBJ)›'
         (↑SUBJ GEND) = c{F}v (↑SUBJ GEND) = 'female'
         (↑SUBJ NUM) = SG
         (Wechsler & Zlatić 2003: 191)

In the following example, the noun 'sentinelle' specifies [(↑GEND) = {F}] inherited by the NP. The semantic form of the predicative adjective (↑GEND) = 'female' would conflict with the grammatical form specified by the noun and thus the disjunct (↑GEND) = {F} is selected for the subject. In this case agreement is syntactic.

(2j)   [La sentinelle á la barbe] est competents
         (↑GEND) = {F}   (↑SUBJ GEND) = c{F}
         The bearded sentry is competent
         (Wechsler & Zlatić 2003: 192)

Both approaches capture effectively the gender resolution phenomena in a number of languages. There are some issues, however, that should be discussed. The main problem for the Dalrymple & Kaplan 2000 analysis is that they analyse data where resolution is syntactic and they do not capture cases with semantic resolution, which mainly occur in animate nouns. This leaves aside a large group of data. For the analysis proposed by Wechsler & Zlatić 2003, the main problem is that they assume that languages show the same resolution results in both animate and inanimate nouns. Thus, they disregard languages where agreement patterns are distinct in animate and in inanimate some of which are MG, Rumanian and Latin.

3. The MG Data

In MG, coordinate nouns of the same gender resolve to that same gender and coordinate nouns of mixed gender resolve to masculine if the nouns are animate and to neuter if the nouns are inanimate. The following examples illustrate cases of inanimate nouns:

(3a)   O   pinakas   ke o   kanapes   ine aspri
         the.*masc.sg* painting.*masc.sg* and the.*masc.sg* sofa.*masc.sg* are white .*masc.pl*
         'The painting and the sofa are white'

(3b)   I   vivliothiki   ke i   trapezaria   ine   skures
         the.*fem.sg* bookcase.*fem.sg* and the.*fem.sg* dining-table..*fem.sg* are dark.*fem.pl*
         'The bookcase and the dining-table are dark'

(3c)   O   kanapes   ke i   karekla   ine aneta
         the.*masc.sg* sofa.*masc.sg* and the.*fem.sg* chair.*fem.sg* are comfortable.*neut.pl*
         'The sofa and the chair are comfortable'

The generalisation is stated as follows:

(3d)   *Greek Inanimate Nouns*
         ·If the conjuncts are all MASC, the masculine form is used
         ·If the conjuncts are all FEM, the feminine form is used
         ·Otherwise resolve to NEUT

Similarly, the following cases illustrate animate nouns:

(3e)   O Petros   ke o Jannis   ine kurasmeni
        the Peter.*masc.sg* and the John.*masc.sg* are tired.*masc.pl*
        'Peter and John are tired'

(3f)   O   pateras   ke i mitera   ine kurasmeni
        the father.*masc.sg* and the mother.*fem.sg* are tired.*masc.pl*
        'Father and mother are tired'

(3g)   I   Maria   ke to pedi   tis ine eksasfalismeni ikonomika
        the Maria.*fem.sg* and the child.*neut.sg* her are secure.*masc.pl* financially
        'Maria and her child are financially secure'

The generalisation is stated as follows:

(3h)   *Greek Animate Nouns*
        ·If the conjuncts are all FEM, the feminine form is used
        ·If the conjuncts are all NEUT, the neuter form is used
        ·Otherwise resolve to MASC

3.1 Unexpected Cases
A number of patterns are found which do not follow the above resolution rules. These patterns will be discussed according to the group of nouns, animate, inanimate concrete and inanimate abstract.
    In animate plural coordinate nouns, the first unusual pattern is when a feminine and a neuter noun with a female referent resolve into neuter:

(3.1a) I jinekes ke ta koritsia ine ikanopiimen-es/-a apo tin sinergasia tus
        the.F ginekes.F and the.N girls.N*f* are satisfied.F/N from their cooperation
        'The women and girls are satisfied from their cooperation'

This is presented below:

(3.1b) FEM & NEUT*m/f*[3] = FEM/NEUT (otherwise MASC)

Inanimate concrete and abstract singular coordinate nouns display the following unexpected resolution patterns:

(3.1c) I kuzina ke i tualeta ine pentakathara, mporeis na ta xrisimopiisis
        the.F kitchen.F and the.F toilet.F are very clean.N, you-can them use
        'The kitchen and the toilet are very clean you can use them'

(3.1d) I dipsa ja eleftheria ke i pisti itan aparetita stin periodo ton agonon
        the.F thirst.F for freedom and the.F faith.F were necessary.N through the period of the fights
        'The freedom and faith were necessary through the war period'

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[3] Nouns with a male or female referent will be marked with the symbol *m, f* respectively.

(3.1e) O pinakas ke o kanapes ine ateriasta. Tha ta valo sto allo domatio
the.M painting.M and the.M sofa.M are unmatched.N. Will them.N put in-the other room
'The painting and the sofa do not match. I will put them in-the other room'

(3.1f) O iroismos ke o agonas itan kiriarxa kata to 1821
the.M heroism.M and the.M fight.M were prevalent.N in 1821
'The heroism and fight were prevalent in 1821'

(3.1g) O kanapes kai i polithrona ine toso aneti oste na kathese oli mera
the.M sofa.M and the.F armchair.F are so comfortable.M so as to seat all day
'The sofa and the armchair are so comfortable to seat all day'

(3.1h) O thanatos ke i eleftheria ine taftosimes stis meres mas
the.M death.M and the.F freedom.F are equivalent.F in-the days our
'The death and freedom are equivalent in our days'

These are summarised below:

(3.1i) MASC & MASC = NEUT (otherwise MASC)
FEM & FEM = NEUT   (otherwise FEM)
MASC & FEM = MASC/FEM (abstract) (otherwise NEUT)

Inanimate concrete plural coordinate nouns have the following unexpected case:

(3.1j) I dromi ke i platies ine gemati kosmo
the.M streets.M and the.F squares.F are full.M of people
'The streets and the squares are full of people

The above case is shown below:

(3.1k) MASC & FEM = MASC   (otherwise NEUT)

4. Referential Agreement in MG Coordinate NPs
The above *unexpected* agreement patterns confirm the existence of a third resolution principle. We will refer to this principle as *referential agreement*.

   Similar mismatch phenomena have been found in other languages, the most characteristic of which is known as "meaning transfer" or "reference transfer" (Nunberg 1977, 1995). This refers to the productive linguistic processes that allow the use of the same expression to refer to distinct sorts of categories of things while agreement is not guided by the inherent properties of the phrase itself but by the referent (Pollard and Sag 1994). A characteristic example is the one below:

(4a)   The hash browns at table nine is getting angry (Pollard and Sag 1994:69)

The noun phrase 'hash browns' is inherently plural and therefore we would expect plural agreement of the verb. Instead, the verb shows singular agreement since the referent is transferred to the person who has placed the order and which is a

nonaggregate entity. Thus, in the above the number feature is affected by reference transfer.

In MG, the phenomenon of reference transfer affects the gender feature. The example below will illustrate the notion:

(4b)   I dromi ke i platies itan jemati kosmo
        the.M streets.M and the.F squares.F were full.M-of people
        'The streets and the squares were full of people'

The coordinate phrase consists of a *masculine* and a *feminine* noun and results in two types of resolved agreement, the expected *neuter* and the unexpected *masculine*. The former occurs in all cases of mixed gender coordination of inanimate nouns and the latter occurs only as a result of reference transfer. We suggest that the presence of the masculine gender in the predicative adjective is due to an implied missing noun, which we will refer to as a Contextually Introduced Referent (CIR) with masculine gender, it does not occur in the phrase but it refers back to the whole coordinate phrase. This Contextually Introduced Referent (implied noun) functions as the superordinate term or the cover term of the two conjuncts and determines morphosyntactically the resolution result since the predicative adjective is forced to inherit the agreement features of the implied noun. Thus, in the example above the Contextually Introduced Referent is the noun *xori* 'spaces' which is the cover term for the two nouns *dromi* 'streets' and *platies* 'squares'.

All of the above cases of unexpected gender resolution fall within the same phenomenon. A possible analysis of referential agreement is an ontological perspective. Ontology traditionally deals with questions concerning what entities exist or can be said to exist, and how such entities can be grouped, related within a hierarchy, and subdivided according to similarities and differences (Genesereth and Nilson, 1987: 10-12). Thus, ontology focuses on the relations of different concepts within a system. One aspect of ontological relations is also that of subordination and superordination. In Schalley and Zaefferer (2007: 4), these two relations are defined as "weak orderings" as follows:

> Conceptual subordination: Concept A[4] is c-subordinated to concept B iff every
> instance of A is also an instance of B, and
> Conceptual superordination, its converse.
> (Schalley and Zaefferer, 2007: 4)

The phenomenon of referential agreement in MG can be captured using a type or template hierarchy used in Head-driven Phrase Structure Grammar (HPSG) or in LFG, respectively. In LFG, the template hierarchy encodes lexical generalisations in terms of relations between *descriptions* of structures and not in terms of any formal inheritance relations between types. These templates are f-structure descriptions with a name which can be used in other equations to state more complicated descriptions (Dalrymple et al, 2004: 201). In other words, these hierarchies are abbreviatory only and they do not carry a real ontological status. On the other hand, HPSG builds linguistic generalisations also using a type hierarchy where more specific types inherit their information from less specific but related types.

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[4] A, B and C stand for the related concepts.

In order to capture the semantic relation of the lexical items in MG, we propose an ontological hierarchy that will show how the various lexical items are related to each other where the more general term includes within it the more specific, following both the template and the type hierarchy proposed by LFG and HPSG, respectively. This hierarchy can be represented as follows:

(4c)   THINGS

              DECORATION   FURNITURE

PAINTINGS   LIGHTS   TABLES
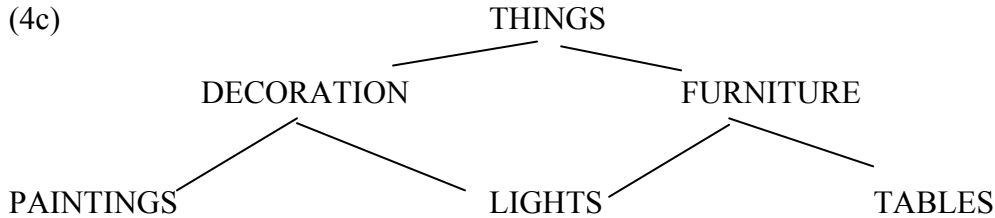
In the hierarchy above, the superordinate term is the noun *things,* which includes as hyponyms the noun *decoration* and the noun *furniture*. Within the noun *furniture,* which also functions as a general term other hyponyms are included like the nouns *lights* and *tables*. Also, the noun *lights* is the hyponym of the general term *decorations* since *lights* could be a piece of furniture or a piece of decoration.

The above preliminary analysis captures effectively the hypernymic-hyponymic relation of the superordinate term with the coordinate nouns. Two issues arise that need to be discussed. First, the representation of this hierarchy may differ from speaker to speaker depending on the world knowledge and perception and on the way the various lexical items are organised in each speaker's mind. Thus, a person may assume a specific hierarchy with a specific superordinate term but a different person may assume a different hierarchy and therefore a different superordinate term for the same coordinate nouns. Second, the nature of the phenomenon, which is contextually motivated, may allow the possibility of additional unexpected gender values resulting from other combinations of nouns that have not been detected so far. Further research is required for a broader collection of data to gather a comprehensive list of all the possible unexpected patterns. This analysis, however, will be left for future research.

5. Conclusion

The present paper has presented gender agreement in MG coordinate nouns. So far two types of gender resolution have been discussed by most linguists, the syntactic and the semantic ones. Our field work has shown that there is an additional gender resolution pattern which is referentially motivated, named as *referential agreement*. As seen above, this type of agreement affects the gender feature in MG. The same phenomenon occurs in other languages, as in English, affecting the number feature. Future research requires a broader collection of data in order to gather and systematically organise additional unexpected patterns and also propose an analysis of the phenomenon based on an ontological perspective.

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