Abstract

In this paper we propose an LFG/XLE treatment of Exhaustive Object Control (EOC) constructions in Greek *na* clauses. We draw on data retrieved from the Hellenic National Corpus (HNC) in order to define the verbs that allow EOC. We treat EOC using anaphoric control. We take the subject of the subordinate *na* clause (controllee) to be a PRO marked with nominative case that is anaphorically related to the object of the matrix clause (controller). We implement this analysis in our LFG/XLE Grammar by adding the new feature ANAPH_C_BY.

1. Introduction

Control is a dependency between an unexpressed subject (the controlled element[1]) and an expressed or unexpressed constituent (the controller; Bresnan 1982). Control constructions in Greek *na* subordinate clauses have been widely discussed in the literature and they still remain a controversial topic (Iatridou 1993, Varlokosta 1994, Philippaki-Warburton and Catsimali 1999, Landau 2002). In this paper, we study exhaustive object control (EOC) in *na* subordinate clauses focusing on the verbal predicates illustrated in (1).

(1) mathainw 'teach', voithw 'help', peithw 'persuade', empodizw 'prevent', protrepw 'urge', epitrepw 'allow', apagoreuw 'forbid'.

In the analysis of EOC in English the subject of the infinitive is functionally controlled by the object of the matrix verb (Bresnan 1982). In the corresponding structure in Greek, the subordinate clause lacks an infinitival verb form but surfaces as a *na* clause, exemplified by (2) (Triadafillidis 1941, Philippaki 2004, Roussou 2009). *Na* complements differ from infinitives, among others, in that they show person and number agreement and in that in combination with certain control verbs, they license overt subjects (3)[2].

1. In constructions like "This book is tough to finish" the controllee could be an object. Dalrymple and King (2000) propose an anaphoric control analysis for these constructions.

2. A detailed anayles is not demonstrated for (3) since the differences between infinitives and *na co*mplements are not the point of this study.

(2) O Nikos apagoreuei ths Marias [*na*
The-DEF Nikos-NOM forbid-3SG the-DEF Maria-GEN [to-COMPL
erthei].
come-3SG][3]
'Nikos forbids Maria to come.'

(3) O Nikos apagoreuei *na* erthei **h**
The-DEF Nikos-NOM forbid-3SG to-COMPL come-3SG the-DEF
Maria.
Maria-NOM
'Nikos forbids Maria to come.'

As a result, the standard analysis of English EOC does not extend to Greek. We provide a theoretical analysis of the phenomenon. This analysis is also tested in the framework of the Greek LFG/XLE Grammar Development and adequacy is attained for these constructions.

In the cases at hand, the object of the matrix clause is always overt and functions as the controller of the subject of the *na* complement. In the literature, there is a general agreement that *na* subordinate clauses display the semantic properties characteristic of control infinitives. Varlokosta (1994) demonstrated, for one, that the subject of *na* clauses systematically is assigned de se readings, just like control subjects in English. However, there is no consensus on how to define the verb class licensing control constructions (Iatridou 1993, Varlokosta 1994, Alexiadou and Anagnostopoulou 1999, Philippaki and Catsimali 1999, Spyropoulos 2007, Kotzoglou and Papangeli 2007, Beys 2007, Roussou 2009). We pursue this issue in a corpus study based on the Hellenic National Corpus (HNC; Hatzigeorgiu et al., 2000). All these predicates are exhaustive control verbs.

In Greek the object of the matrix clause is always overt and functions as the controller of the subject of the *na* complement. The object controller can be marked either by different cases or it can be embedded within a PP[4]. In (4a) the object of the matrix verb is expressed in accusative case ('th Maria') while in (4b) in genitive case ('ths Marias'). In (4c) the object of the matrix verb is embedded within a se-PP ('sth Maria'), which is considered to be an oblique argument (OBL-TO). As can be observed there is no featural identity between the controller and the controllee which is always covert and marked with nominative case ('h Maria').

3. Nouns and determiners in Greek should have number, gender and case agreement on them. We only gloss them for case since number and gender are not important for our study.

4. Its EOC verb allows for different subcategorization frames. See table 3 for a detailed picture of the structures supported by each verb.

(4) a. O Kostas mathainei th Maria *na*
The-DEF Kostas-NOM teach-3SG the-DEF Maria-ACC to-COMPL
milaei (h Maria) Agglika.
speak-3SG (the –DEF Maria-NOM) English-ACC
'Kostas teaches Maria to speak English.'

b. O Kostas mathainei ths Marias
The-DEF Kostas-NOM teach-3SG the-DEF Marias-GEN
na milaei (h Maria) Agglika.
to-COMPL speak-3SG (the –DEF Maria-NOM) English-ACC
'Kostas teaches Maria to speak English.'

c. O Kostas mathainei sth Maria
The-DEF Kostas-NOM teaches-3SG se-PREP Maria-ACC
na milaei (the-DEF Maria- NOM) Agglika.
to-COMPL speak-3SG (h Maria) English-ACC.
'Kostas teaches Maria to speak English.'

In the following section, we discuss some of the properties of the *na* clauses. In §3 we illustrate the corpus retrieved data and the annotation schema followed in this study. §4 presents how control constructions are treated within the LFG Framework. In §5 we present our analysis of EOC in Greek and the implementation of this analysis in our LFG/XLE Grammar. Finally, in §6 we draw our conclusions.

2. **The case of *na* clauses**

We study control constructions in the case of *na* subordinate clauses. These clauses are associated with controversial linguistic issues such as the syntactic nature of *na*, the subjunctive and the lack or presence of an infinitive in Greek. Firstly, there is no unanimity as to whether *na* is a complementizer or not. Veloudis & Philippaki-Warburton (1984) and Terzi (1992) have analyzed *na* as a subjunctive marker while Tsimpli (1990) analyzed *na* as a modality marker that selects agreement and untensed phrases. On the other hand, Agouraki (1991) and Tsoulas (1993) claim that *na* is a complementizer and its meaning depends on the time reference of the main verb. A recent view that reconciles the two approaches has been proposed by Roussou (2000), within a Split-CP framework. Fiotaki (2014) treats *na* as a complementizer that introduces main and subordinate clauses expressing different modalities.

In general it is not clear whether a uniform semantics for *na* clauses is possible, and this raises multiple questions not only for Greek but crosslinguistically (Quer 2009). In Modern Greek, the indicative and the subjunctive mood have no different morphological endings although the

moods exist (Mozer 2009). In the traditional Greek grammar the subjunctive mood can be found in Simple Present (e.g *na* paizw), Simple Past (e.g *na* paiksw) and Present Perfect (e.g *na* echw paiksei). The above verb types can also form indicative (5; Triadafullidhs 1941).

(5) a. O Panos mathainei to paidi
The-DEF Panos-NOM teach-3SG the-DEF child-ACC
tou ***na*** **diavazei.**
his-GEN POSS **to-COMPL study-3SG SUBJUNCTIVE**
'Panos teaches his child to study.'

b. O Panos **diavazei** ena
The-DEF Panos-NOM **study-3SG INDICATIVE** a-INDEF
vivlio.
book-ACC
'Panos studies a book.'

If we study *na* subordinate clauses from a syntax-semantics point of view, we have to deal with the dependent verbal form (e.g. paiksw) with no formal mood features, the so called PNP (Holton et al. 2012, Tsangalidis 2002, Giannakidou 2009, Lekakou & Nilsen 2009). The distribution of PNP triggers debate among linguists. PNP is not annotated by default in the feature TENSE (morphological tense) but it instantiates the combination of perfective and non past (Tsangalidis 1999, Giannakidou 2009, Iatridou et al. 2002). This verb form can occur under the subjunctive marker *na,* but also under the future/modal particle *tha*, the conditional *an*, the optative *as* and sometimes under some temporal connectives, for instance *prin 'before', otan 'when'* (6; Giannakidou, 2007). All of these are able to shift forward the evaluation time of the verb they embed.

(6) a. O Panos epeise to Giorgo
The-DEF Panos-NOM persuade-3SG the-DEF George-ACC
na paiksei-PNP volleu
to-COMPL play-3SG PNP volleyball-ACC
'Panos persuaded George to play volleyball.'

b. O Giorgos tha paiksei-PNP
The-DEF Giorgos-NOM will-PART play-3SG PNP
volleu.
volleyball-ACC
'George will play volleyball.'

All the above issues raise the question that regards the presence of tense in the verb head of *na* clause (Tsimpli 1990, Aggouraki 1991, von Stechow 1995). Controlled *na* subordinate clauses are generally accepted to be untensed (Fiotaki and Markantonatou 2004).

In our study we follow Fiotaki and Markantonatou (2004) in that:

- *Na* is a complementizer.
- Verb head of *na* clause is marked with indicative mood.
- Verb head of *na* clause is untensed and is marked with the feature TENSE by default.

3. The Corpus study

In the literature there is not a recorded list of verbs that allow EOC in Greek. Trying to define these verbs we studied at first 18 verbs (7) that in general are considered to take part in control constructions (Iatridou 1993, Varlokosta 1994, Alexiadou and Anagnostopoulou 1999, Philippaki and Catsimali 1999, Spyropoulos 2007, Kotzoglou and Papangeli 2007, Beys 2007, Roussou 2009).

(7) lew ‘tell’, epitrepw ‘allow’, sumvouleuw ‘advice’, upochrewnw ‘obligate’, diatazw ‘order’, entharrunw ‘encourage’, mathainw ‘teach, peithw ‘persuade’, dokimazw ‘try’, aphhnw ‘let’, apagoreuw ‘forbid’, empodizw ‘prevent’, deichnw ‘show’, thumamai ‘remember’, voithw ‘help’, protrepw ‘urge’, susthnw ‘recommend’, parakolouthw ‘watch’, chairomai ‘be glad’.

The data were drawn from the HNC which is a balanced corpus of written Modern Greek texts developed by the Institute for Language and Speech Processing (ILSP). It currently contains about 50.000.000 words and is constantly being updated. HNC consists of texts from several media which provide evidence for the current use of Modern Greek since texts rich in idiomatic or dialectic forms are excluded (Hatzigeorgiu et al., 2000). It allows lemma searches. For every lemma it returns up to 2000 sentences. It also gives the user the ability to make queries for specific words, lemmata, parts of speech and up to three combinations of all the above in which users can specify the distance among lexical items.

In our study we searched the verbs mentioned above as lemmas combined with the particle *na*. The specified distance between the verb and *na* was defined as up to 5 words. For all the above verbs HNC provided us with 19.998 sentences in total. We examined these sentences to find which ones contained the structure we were interested in. We came up with 7 verbs

that allow EOC constructions (1)[5] HNC returned 9054 sentences for these verbs, out of which 4705 contained the relevant structure (V + OBJ + *na* clause). Table 1 shows the precise number of the data retrieved for each verb.

Verb	Sentences in total	Sentences with the relevant structure
empodizw (prevent)	959	768 (80%)
protrepw(urge)	316	281 (88,9%)
epitrepw (allow)	2000	1390 (69,5%)
apagoreuw (forbid)	708	344 (48,6%)
peithw (persuade)	1249	660 (52,8%)
voithw (help)	2000	1153 (57,6%)
mathainw (teach)	1822	109 (5,98%)

Table 1. HNC data

Since this study aims to enrich the Greek XLE Grammar that is being developed, we decided to follow the unified analysis of the tense system and the subjunctive mood as it is proposed by Fiotaki and Markantonatou (2014). According to them, the traditional analysis cannot capture the entirety of the Greek verb types, so a multilevel analysis is needed. Their proposal provides a Greek verbal tense system that models tense usage in main clauses and *na* subordinate ones. The tense system was adopted in the spirit of Reichenbach (1947) who introduces three abstract time points: Speech time (S), Event time (E), Reference time (R). The features of this tense system are described below:

- Linguistic Time (LING_TIME; TENSE as proposed by ParGram) models the relation between S and R with values +/- PAST.
- Time Frame (T_FR) encodes the relation between R and E with values N(ot)IDEN(tical) and IDEN(tical).
- Anticipation (ANTIC; FUTURE as proposed by ParGram) models the presence of the particle *tha*.
- Telicity expresses the grammatical aspect with values Perfective (PE) and Imperfective (IP).

The overall system of features is presented in Table 2. In the second column all the verb types attested in main declarative clauses are presented along

5. HNC did not provide us enough data for the verbs parakolouthw ‘watch’ and voithw ‘help’. So for the time being we cannot make a certain claim for these verbs, although as native speakers we tend to assume that these verbs do not allow EOC, since we can easily come up with counterexamples.

with the English gloss (column 3). The next column provides the traditional analysis of the tense system in Greek by assigning the value (+/- Past) for each verb type. The next four columns capture the features of the tense system as described above.

Verb type	Greek Form	English Gloss	Tr.Anal	LING_TIME	T_FR	TEL	ANTIC
1	paizw	play/be playing	–PAST	–PAST	IDEN	IP	–
2	epaiza	was playing	+PAST	+PAST	IDEN	IP	–
3	epaiksa	played	+PAST	+PAST	IDEN	PE	–
4	tha paizw	will be playing	–PAST	–PAST	IDEN	IP	+
5	tha paiksw	will play	–PAST	–PAST	IDEN	PE	+
6	tha epaiza	would play	Ø	+PAST	IDEN	IP	+
7	echw paiksei	have played	+PAST	+PAST	NIDEN	PE	–
8	eicha paiksei	had played	+PAST	+PAST	NIDEN	PE	–
9	tha echw paiksei	will have played	Ø	–PAST	NIDEN	PE	+
10	tha eicha paiksei	would have played	Ø	+PAST	NIDEN	PE	+

Table 2. Analysis of verbal tenses in Modern Greek

Having in mind the above tense system, we created annotation labels for the verb of the matrix and the subordinate clause. We also needed labels for the type and the case of the matrix object as this is the controller. So, the data retrieved were annotated following the schema below:

- The labels **NON_PAST**, **PAST**, **FUTURE**, **FUTURE_+PAST** and **PNP** are used for both the verbs of the matrix and the *na* subordinate clause. These labels correspond to the temporal properties of the verb types based on the value of the feature LING_TIME (Table 2). Future tenses needed to be distinguished (labels FUTURE and FUTURE_+PAST) since the complementizer *na* stands in complementary distribution with the future particle *tha* (see Table 2 feature Anticipation). The label PNP was used for all the verb types corresponding to ‘na paiksw’ (section 2).

  Table 3 represents the labels and their correspondent temporal properties according to Table 2. The first column presents the labels used in the annotation schema. The second and third column present the temporal properties of each label as described above.

LABELS	LING_TIME	ANTIC
NON_PAST	–PAST	–
PAST	+PAST	–
FUTURE	–PAST	+
FUTURE_+PAST	+PAST	+

Table 3. The labels and their correspondence to the temporal properties of the verb types.

- The labels **ACC (OBJ)**, **GEN (OBJ)** and **PP (OBL-TO)** are used for the object of the matrix clause.

(8) represents an annotated example.

(8) mas **(ACC(OBJ))** empodizei **(NON_PAST)** *na*
us-OBJ prevents-3SG to-COMPL
epituchoume **(NON_PAST)** tous stochous.
achieve-3sg the-DEF goals-ACC
'It prevents us from achieving the goals.'

As you can see, there is not a direct correspondence between the tense features described in Table 2 and the labels used in our annotation schema. This is due to the fact that we aimed in designing functional templates for our XLE/LFG grammar. So, we decided to generalize the features that describe the temporal properties of the verbs. This generalization made the process of annotation faster without leading to ambiguity or loss of information from the adopted tense system. Also, this simplest form of the tense system can be used in the future for the annotation of examples concerning various phenomena with the exception of phenomena affected from the temporal property "Telicity" since this feature is not included in this schema.

This process of annotation gave us a clear picture of the structures supported by each verb. In Table 4 the three more frequent structures supported by each verb are presented. The first column presents the annotated verbs along with their english translation. Next the structures supported by each verb are given (column 2). The temporal properties of the main verb (column 4) and the subordinate verb (column 5) follow. Finally, the overall percentage of each structure is given.

Verb	Syntactic Structure	Temporal properties of the main verb	Temporal properties of the *na* clause verb	Percentage
apagoreuw (forbid)	A. Vmain + ACC (OBJ) / GEN (OBJ) / PP (OBL-TO) + *na* clause	1. NON PAST	1. NON PAST	1. 30,8%
	B. Vmain + GEN (OBJ) / PP (OBL-TO) + *na* clause	1. NON PAST 2. PNP	1. PNP 2. PNP	1. 22,4% 2. 3,5 %
epitrepw (allow)	A. Vmain + GEN (OBJ) / PP (OBL-TO) + *na* clause	1. NON PAST	1. PNP	1. 31%
	B. Vmain + ACC (OBJ) / GEN (OBJ) / PP (OBL-TO) + *na* clause	1. NON PAST 2. FUTURE	1. NON PAST 2. PNP	1. 22% 2. 11,6%
empodizw (prevent)	Vmain + ACC (OBJ) + *na* clause	1. NON PAST 2. PAST 3. NON PAST	1. PNP 2. PNP 3. NON PAST	1. 30,6% 2. 26,9% 3. 15,5%
mathainw (teach)	Vmain + ACC (OBJ) / GEN (OBJ) / PP (OBL-TO) + *na* clause	1. PAST 2. PNP 3. NON PAST	1. NON PAST 2. NON PAST 3. NON PAST	1. 40,3% 2. 28,5% 3. 16,5%
peithw (persuade)	Vmain + ACC (OBJ) + *na* clause	1. PNP 2. PAST 3. PNP	1. PNP 2. PNP 3. NON PAST	1. 65,6% 2. 15,3% 3. 6,8%
protrepw(urge)	Vmain + ACC (OBJ) + *na* clause	1. NON PAST 2. PAST 3. NON PAST	1. PNP 2. PNP 3. NON PAST	1. 38,8% 2. 36% 3. 30,2%
voithw (help)	Vmain + ACC (OBJ) + *na* clause	1. PNP 2. PAST 3. NON PAST	1. PNP 2. PNP 3. PNP	1. 27,9% 2. 22,8% 3. 20,3%

Table 4. Structures supported by each verb.

4. Exhaustive Object Control in the LFG Framework

In this section we study control constructions based on the criterion of the featural identity between the controller and the controllee.

LFG uniformly treats control constructions involving featural identity between controller and controllee as manifestations of functional control (Bresnan 1982). In this case the two functions, the controller and the controllee are allowed to have the same f-structure as their value (Falk 2001). This analysis can treat EOC in English (9) and Greek subject control constructions (10).

(9) Frank persuaded Mary to leave.[6]

(10) H Zwh emathe *na* kolumpaei.
the-DEF Zwh-NOM learned-3SG to-COMPL swim-3SG
'Zoi learned to swim.'

In this analysis, the infinitive 'to leave' in (9) and the embedded clause 'na kolumpaei' (10) are treated as an XCOMP argument of the matrix verb. This is the case where the person who was persuaded by Frank and the person who left must be one and the same person (9).

Contrary to the EOC in English (9) in Greek EOC, the controller and the controllee differ in Case features (2). In (9) the controller ('Mary') and the controllee (unexpressed subject) are both in accusative case, while in (2) the controller ('ths Marias') is in genitive case and the controllee (unexpressed subject) bears nomitave case (see section 5).

(2) O Nikos apagoreuei ths Marias [***na***
The-DEF Nikos-NOM forbid-3SG the-DEF Maria-GEN [to-COMPL
erthei].
come-3SG]
'Nikos forbids Maria to come.'

In this case there is an anaphoric link between the unexpressed subject of the *na* clause and the object 'ths Marias'. This control relation is called anaphoric control (Bresnan 1982, Falk 2001). Such occurrences of control are argued to occur with COMP. Under this analysis, the subject of the COMP is a PRO anaphorically related with the object of the matrix clause (Bresnan 1982, Darlymple 2001).

Another way of treating control phenomena is subsumption, which is a way of modelling asymmetric information. Zaenen and Kaplan use subsumption to treat partial VP fronting in German (2002) and subject

6. Examples like (9) can also be treated using anaphoric control (Dalrymple 2001, Falk 2001).

inversion in French (2003). Sells (2006) models forward and backward control and raising structures using subsumption. Subsumption allows us to constrain the information in the f-structure level: 'subsumption establishes an ordering relation between two units of information, stating that the one subsuming the other contains less information (or is less specific or more general) than the one that is subsumed' (11; Zaenen and Kaplan 2002)

(11)

Definition of Subsumption: $f \sqsubseteq g$ iff
f and g are the same symbol or semantic form, or
f and g are both f-structures, $\mathrm{Dom}(f) \subseteq \mathrm{Dom}(g)$, and $(f\ a) \sqsubseteq (g\ a)$ for all $a \in \mathrm{Dom}(f)$, or
f and g are both sets and every element of $f \sqsubseteq$ some element of g

$$f = \begin{bmatrix} \mathrm{A} \begin{bmatrix} \mathrm{C} + \end{bmatrix} \end{bmatrix} \sqsubseteq \begin{bmatrix} \mathrm{A} \begin{bmatrix} \mathrm{C} + \\ \mathrm{D} - \end{bmatrix} \\ \mathrm{B}\ \mathrm{E} \end{bmatrix} = g$$

Subsumption deals with case mismatch by making use of the restriction mechanism. Although using subsumption seems a viable solution for modeling EOC in Greek, for the time being we think that these cases are better treated using anaphoric control since Greek is a language which uses extensive morphological case marking. The restriction of case may affect the expressivity and the efficiency of our LFG/XLE Grammar. Also, by definition (11) subsumption contrasts with the one of the basic points of our proposal (section 5). According to our analysis PRO and the controller are two different semantic forms and thus PRO cannot be subsumed by the controller since their f-structures contain different elements. We follow Falk (2001:141) in that the controller and the controllee are "both considered to be thematic arguments of their respective verbs, and so they must be two distinct D-structure elements".

5. Our proposal

We propose to treat EOC as an instance of anaphoric control in the sense of Bresnan (1982), hence to analyze *na* subordinate clauses as implicating COMP functions. Given that COMP is also used as a formal device to model partial control one could hypothesize that EOC in Greek should admit partial control (Landau 2013; Pearson 2015). This prediction is not at all confirmed, as shown by the ill-formedness of the partial control structure in (12) which

is not allowed with an EOC predicate (in this case mathainw 'teach'). (13) demonstrates that partial control is attested with subject control predicates.

(12) *O Giannis mathainei th Maria
the-DEF John-NOM teaches-3SG the-DEF Maria- ACC
na mazeuei mazi tomates/
to-COMPL pick up-3SG together- ADV tomatoes-ACC/
na sunanththoun.
to-COMPL meet-3PL
'John teaches Maria to pick up tomatoes together/to meet.'

(13) O Giannis proteine *na* sunanththoun.
the-DEF John-NOM proposed-3SG to-COMPL meet-3PL
'John proposed to meet.'

Interestingly though, the absence of collective readings for the EOC subject correlates with the absence of a second property which has been found to be characteristic of partial control predicates, i.e. temporal independence of the embedded clause. Combining a future oriented embedded adverbial with past matrix predicate leads to ill-formed results in the case of EOC verbs (14a), while these structures are acceptable when combined with partial control verbs (14b; on the relation between partial control and tense see Landau 2013; Pearson 2015).

(14) a. *Chthes o Giannis emathe th Maria
Yesterday the-DEF John-NOM taught-3SG the-DEF Maria- ACC
na grafei aurio.
to-COMPL write-3SG tomorrow- ADV.
'*Yesterday, John taught Maria to write tomorrow.'

b. *Chthes o Giannis proteine ths Marias
Yesterday the-DEF John-NOM suggested-3SG the-DEF Maria-GEN
na fugei aurio.
to-COMPL leave-3SG tomorrow- ADV.
'*Yesterday, John suggested Maria to live tomorrow.'

As mentioned above, we analyze EOC as an instance of anaphoric control. Bresnan (1982) argues that anaphoric control requires the presence of PRO, which is expressed only in f-structure. We propose that in Greek EOC constructions the subject of the *na* subordinate clause is a PRO[7] anaphorically controlled by the object of the matrix verb (15).

7. Although written in caps, this PRO is not identical to GB's big pro.

(15) O Kostas mathainei th Maria
The-DEF Kostas-NOM teach-3SG the-DEF Maria-ACC
[*na* PRO milaei Agglika].
[to-COMPL PRO speak-3SG English-ACC]
'Kostas teaches Maria to speak English.'

We follow Bresnan (1982) in that PRO is a semantic form and thus should be introduced in the lexicon. Specifically, it is introduced in the lexical entry of the governing verb. We claim that since PRO is the subject of the *na* subordinate clause it is case marked with nominative since:

i. In non-control cases the subject of the *na* subordinate clause is overtly expressed and bears nominative case (16). As we can conclude the covert subject of the *na* subordinate clause (the cotrollee) always bears nominative case. As Landau points out 'whenever a language provides means to detect the case of PRO it is identical to the case that a lexical DP would have been in the same position' (Landau 2013:104).

(16) O Giorgos eipe *na* kleisei
The-DEF Giorgos-SUBJ/NOM tell-3SG to-COMPL close-3SG
o Dimitris to parathuro.
the-DEF Dimitris-SUBJ/NOM the-DEF window-ACC
'George told Dimitris to close the window.'

ii. The embedded subject modifier of the covert subject appears in nominative case and not in accusative (17; Spyropoulos 2007, Kotzoglou and Papangeli 2007, Beys 2007).

(17) H Maria epeise to Gianni
The-DEF Maria-NOM persuade-3SG the-DEF Gianni-ACC
na fugei teleutaios / *teleutaio.
to-COMP leave-3SG last-MOD-NOM / * last MOD-ACC
'Maria persuaded John to leave last.'

iii. Although there is a controllee, an overt pronoun in nominative case can be licensed in *na* subordinate clause along with the conjunction "kai" for emphasis (18). In Greek this is a standard way to do emphasis. This pronoun is coreferential with the object of the matrix verb.

(18) Epeisa to Gianni *na* erthei
Persuade-3SG the-DEF Giannni-ACC/OBJ to-COMPL come-3SG
kai autos sto parti.
and-CONJ he-PRN/NOM to-PREP the-DEF party-ACC
'I persuaded John to (he) come to the party.'

To sum up, we propose that the subject of the embedded *na* clause in EOC is a semantic PRO anaphorically related to the object of the matrix verb that bears nominative case.

This anaphoric relation between PRO and its antecedent (object or oblique) must be expressed in the f-structure. For this reason, we introduce the new feature "Anaphorically_controlled_by" (ANAPH_C_BY) with the value OBJ (4a-b) or OBL-TO (4c), signaling that the predicates in (11) are not only marked for anaphoric control but also include a lexically required feature restricting arguments to a particular type of *na* complements (de se properties). As a result, there are two subtypes of COMP, one for clausal arguments that have their own overt or non overt subject and one for clausal arguments that have their subject anaphorically controlled by the object of the matrix verb.

(19) is a representative example of how EOC is treated in our LFG/XLE Grammar. In our effort to parse the corpus retrieved examples we defined two templates (20) that assign the allowed syntactic structures. The lexical entry for the verb *apagoreuw* 'forbid' is (21). The output of the parsed example is illustrated in (22).

(19) H Maria apagoreuei sto
the-DEF Maria-NOM forbid-3SG se-PREP the-DEF
paidi ths *na* paizei mpala.
child-ACC her-GEN POSS to-COMPL play-3SG ball-ACC
'Mary forbids her child to play ball.'

(20) Templates

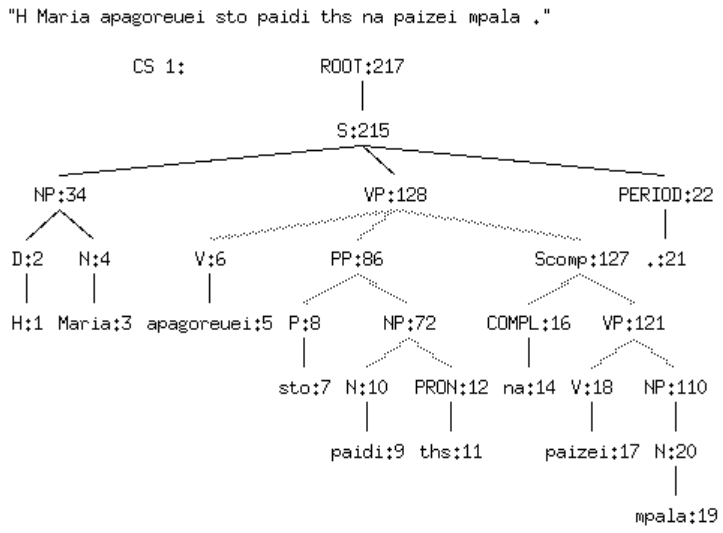
a. V-SUBJ-OBJ-COMP(P) = "closed comp verbs with subject anaphorically controlled by object"
(^ PRED) = 'P<(^ SUBJ)(^OBJ)(^ COMP)>'
(^ COMP SUBJ PRED) = 'PRO'
(^ COMP SUBJ CASE) = NOM
(^ COMP SUBJ ANAPH_C_BY)= OBJ.

b. V-SUBJ-OBL-TO-COMP(P) = "closed comp verbs with subject anaphorically controlled by OBL-TO"
(^ PRED) = 'P<(^ SUBJ)(^ OBL-TO)(^ COMP)>'
(^ COMP SUBJ PRED) = 'PRO'
(^ COMP SUBJ CASE) = NOM
(^ COMP SUBJ ANAPH_C_BY)= OBL-TO.

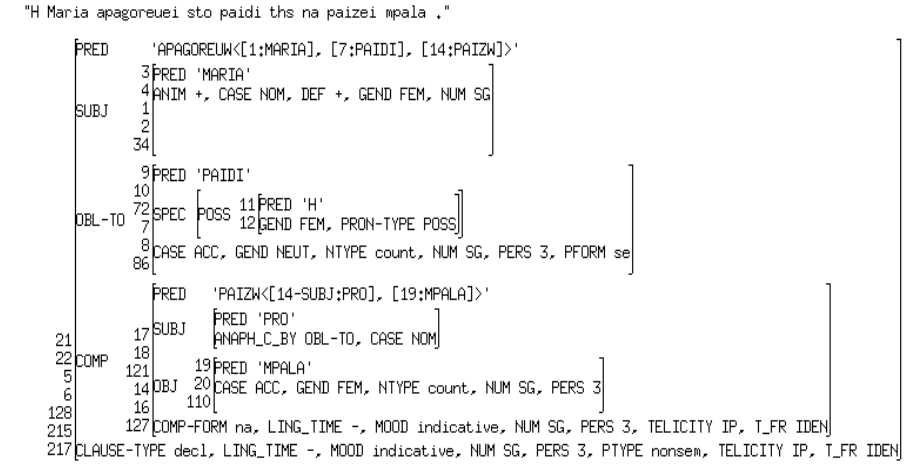
(21) Lexical entry

```
apagoreuei    V * {@(OPT-TRANS APAGOREUW)
                   |@(V-SUBJ-OBJ-COMP APAGOREUW)
                      (^ COMP-FORM ) = na
                   |@(V-SUBJ-OBL-TO-COMP APAGOREUW)
                      (^  COMP-FORM ) = na}
                    @(TENSE  -)
                    @(T_FR IDEN)
                    @(TELICITY IP)
                    @(MOOD indicative)
                    @(PERS 3)
                   @(NUM SG).
```

(22a) c-structure



(22b) f-structure



We have integrated the presented analysis of EOC into the fragment of the LFG/XLE Greek grammar. In order to measure the grammar efficiency of the proposed analysis we created a test suite which derived from the annotated corpus and contains 50 sentences per verb. Out of the 350 sentences of the test suite 236 are parsed. Some of the sentences are not parsed because they contain complex constructions not yet covered by our grammar and not due to flaws of our proposed analysis.

6. Conclusions

This paper demonstrates how EOC in Greek can be formalized in the LFG/XLE Grammar using anaphoric control. The proposed analysis allows for the case of the controller and the controllee to be overtly expressed in the f-structure. This expressivity is important for the flexibility of our newly developed grammar which should take into consideration other phenomena in which case seems to play an important role such as coordination.

The described annotated corpus can be used for the study and grammar modeling of the problematic issues related to *na* clauses such as PNP structures. Furthermore, this data could be the base for the study of coordination in *na* clauses.

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