

## Comprehension asymmetries in language acquisition: a test for Relativized Minimality\*

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### ABSTRACT

Cross-linguistic studies have shown that typically developing children have difficulties comprehending non-canonical structures. These findings have been interpreted within the Relativized Minimality (RM) approach, according to which local relations cannot be established between two terms of a dependency if an intervening element possesses similar morphosyntactic features. In an extension of RM, Friedmann, Belletti, and Rizzi (2009) suggested that lexical NP restriction is the source of minimality effects in non-canonical sentences. The present study aimed at investigating whether the predictions of their account can be confirmed in Greek. Our results indicate that although lexical NP restriction is a crucial factor in generating minimality effects, it is not always sufficient to account for the comprehension difficulties that young children face with non-canonical sentences, since the internal

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structure (i.e. the feature specification) of the moved element and of the intervener affects their performance, as well.

## INTRODUCTION

Cross-linguistic research on language acquisition has shown that, up to the age of six, typically developing (henceforth, TD) children have selective difficulties interpreting structures that involve *wh*-movement, such as *wh*-questions and relative clauses. Typically, structures with canonical argument order (e.g. subject *wh*-questions (*Who is pulling the athlete?*), subject relative clauses (*Show me the doctor that is pulling the athlete*)) are better comprehended, compared to structures with non-canonical argument order (e.g. object *wh*-questions (*Who is the athlete pulling?*), object relative clauses (*Show me the doctor that the athlete is pulling*)) (for *wh*-questions: Avrutin, 2000; De Vincenzi, Arduino, Ciccarelli & Job, 1999; Friedmann, Belletti & Rizzi, 2009; Tyack & Ingram, 1977; among others; for relative clauses: Brown, 1972; Friedmann *et al.* 2009; Guasti, Branchini, Arosio & Vernice, 2012; among others). Subject/object asymmetries have also been observed in the production of *wh*-questions and relative clauses in child language (Contemori & Belletti, 2013; Guasti, Branchini & Arosio, 2012; Wilhelm & Hanna, 1992; among others). Moreover, several studies have revealed subject/object asymmetries in atypical language acquisition (Contemori & Garraffa, 2010; Deevy & Leonard, 2004; Friedmann & Novogrodsky, 2004, 2011; Marinis & van der Lely, 2007; Stavrakaki, 2001a, 2001b; among others) and in agrammatic aphasia (Caramazza & Zurif, 1976; Grodzinsky, 1989; Neuhaus & Penke, 2008; among others).

The comprehension difficulties with object-extracted constructions, which have been attested in adult sentence processing studies as well (De Vincenzi, 1991; Frazier & Flores D'Arcais, 1989; among others), have been explained as an effect of the length between the *wh*-element and its trace/copy within the Minimal Chain Principle account (De Vincenzi, 1991; De Vincenzi *et al.*, 1999); object-extracted structures require the formation of longer chains, compared to subject counterparts, thus inducing a more costly computation. Alternatively, within the Memory-Interference account, object-extracted structures are harder because in processing them, two Determiner Phrases (henceforth, DP) are held in memory and are subsequently retrieved, whereas this is not the case in the processing of subject-extracted structures (Gordon, Hendrick & Johnson, 2001, 2004). Recently, the difficulties with object dependencies have been interpreted by Grillo (2005, 2009) within the Relativized Minimality (henceforth, RM) approach to locality in syntax (Rizzi, 1990, 2004; Starke, 2001). According to the formal definition of RM in (1), syntactic relations in natural languages are satisfied in the smallest structural domain (i.e. minimal

configuration) in which they can be satisfied. In other words, RM predicts that minimality effects between two terms of a dependency, X and Y, are caused by an intervening element Z whose set of features belong to the same class as X, because this element will be recognized as a possible candidate for the establishment of the chain relation between the two terms of the dependency, and, consequently, it will block it.

(1) Minimal Configuration: ... X... Z... Y...

- Y is in a minimal configuration (MC) with X iff there is no Z such that:
- a. Z is of the same structural type as X, and
  - b. Z intervenes between X and Y (in terms of c-command)

(Rizzi, 2004, p. 225)

To define similarity in structural type, Grillo (2005, 2009) adopts Rizzi's (2004) Cartographic Approach, according to which each syntactic position in the syntactic tree can be defined by a particular set of morphosyntactic features "and such features can be cataloged in virtue of the 'class' they belong to: a. Argumental: person, gender, number, case; b. Quantificational: *wh-*, Neg, measure, focus ...; c. Modifiers: evaluative, epistemic, Neg, frequentative, celerative, measure, manner ...; d. Topic)" (Grillo, 2009, p. 1432).

This approach was used by Garraffa and Grillo (2008) and Grillo (2005, 2009) to account for subject/object asymmetries observed in agrammatic aphasia. The authors suggest that because of processing limitations that agrammatic speakers have, they lack the ability to activate (or maintain) a full array of  $\phi$ -features in their syntactic representations. As a consequence, they perform poorly in structures that involve movement of an element from its base generated position to another position, when movement crosses over an intervening element and the features of the intervening and of the moved element belong to the same class (Argumental, Quantificational, Modifier, Topic) (2) (Garraffa & Grillo, 2008, p. 181).

(2) ... X ... Z ... Y



Thus, according to RM, a decline in the performance of agrammatic speakers is predicted for sentences with non-canonical argument order, as a result of the presence of an intervening DP between the moved element, which is also a DP, and its trace/copy (Grillo, 2005, 2009), as illustrated in (3). For instance, in object questions (4b and 4d), when the *wh*-object (*which man, who*) moves from its base generated position, it crosses over the subject (*the woman*); in contrast, in subject questions (4a and 4c),

when the *wh*-subject (*which man*, *who*) moves from its base generated position, it does not cross over another argument. Nerantzini, Varlokosta, Papadopoulou, and Bastiaanse (2014) consider Grillo's (2005, 2009) RM approach in order to investigate the role of syntactic function (subject vs. object) and  $\phi$ -features in the production and comprehension of *wh*-questions and relative clauses in a group of six Greek-speaking individuals with agrammatic aphasia. The authors argue that RM cannot explain the full range of subject/object asymmetries observed in the production and comprehension of *wh*-movement structures in Greek agrammatic aphasia, as some of the findings in their study are not compatible with the predictions that this account makes.

(3) DP<sub>-object</sub> . . . . DP<sub>-subject</sub> . . . . DP<sub>-/t-object</sub>

- (4) a. [Which man]<sub><which man></sub> is chasing the woman? (subject referential question)  
 b. [Which man] is **the woman** chasing <which man>? (object referential question)  
 c. [Who]<sub><who></sub> is chasing the woman? (subject non-referential question)  
 d. [Who] is **the woman** chasing <who>? (object non-referential question)

RM has been implemented to account for subject/object asymmetries observed in child language as well. In an extension of the RM approach, Friedmann *et al.* (2009) claimed that not all object dependencies are equally hard, and thus not every moved or intervening element causes minimality effects in crossing dependencies. By presenting a series of experiments in 22 Hebrew-speaking children, aged from 3;7 to 5;0, Friedmann *et al.* (2009) showed that structural similarity or dissimilarity between the moved element and the intervening subject results in selective difficulties in language acquisition. More specifically, structures in which both the moved and the intervening element are structurally similar in terms of lexical NP restriction (i.e. structures in which both DPs contain a lexical NP) cause severe difficulties in children. Within their account, referential object questions such as (4b), which contain a moved DP with a lexical NP specification, are predicted to be harder, compared to their non-referential counterparts (4d), because in the former question type, when the *wh*-object DP (*which man*) moves from its base generated position, it crosses over a similar element, namely a DP with an overt lexical NP (*the woman*). In this case both the moved element and the subject are lexically restricted, resulting in minimality/intervention effects. In contrast, non-referential object questions, such as (4d), are predicted to be easier in child language due to the absence of lexical NP restriction in the moved element. Friedmann *et al.*'s (2009) results revealed selective difficulties in crossing dependencies. Children performed well in the comprehension (and production) of non-canonical constructions when the moved element was structurally

dissimilar (in terms of lexical NP restriction) to the intervening DP subject (as in object *who* questions (4d) and in object free relatives), while they performed poorly in structures where a lexical NP was present in the *wh*-phrase (as in object *which-NP* questions (4b) and in object headed relative clauses). Thus, it was shown that the internal structure of the moved DP involved in crossing dependencies affects children's performance. Moreover, Friedmann *et al.* (2009) showed that when a *wh*-element crosses a subject that has no lexical NP restriction, such as in the case of object headed relatives with an impersonal arbitrary *pro* subject (that has plural specifications, shown on the agreeing verb; Shlonsky, 1997), no minimality effects arise. Although the authors attribute this to the lack of lexical NP restriction in the intervening subject, they leave open the question whether the lack of minimality effects in these cases is due to the null nature of the subject (*pro*) or to the difference in the agreement features between the target and the null pronominal subject intervener.

Friedmann and Costa (2010) tested intervention effects in constructions that do not involve *wh*-movement but a crossing dependency, such as coordinated sentences (e.g. [*The grandma<sub>i</sub> drew **the** girl<sub>j</sub>*] and [*t<sub>i</sub> smiled*]). Hebrew- and European Portuguese-speaking children, aged from 3;4 to 5;6, performed poorly in the comprehension of structures with a crossing dependency coordination in both languages, showing similar performance to that observed in *wh*-movement dependencies, such as object relatives. The authors proposed that crossing dependencies in which an argument crosses over another argument with which it shares lexical NP restriction, regardless of whether *wh*-movement is involved, affect children's performance in comprehension tasks.

Adani, van der Lely, Forgiarini, and Guasti (2010) argue that a more detailed definition of lexical restriction than the one proposed by Friedmann *et al.* (2009) is necessary to explain the full array of comprehension data regarding object dependencies. The authors report evidence from 50 Italian-speaking TD children, aged from 5;0 to 9;0, that comprehension improves by manipulating the DP features involved in crossing dependencies. By assessing object center-embedded relative clauses, they observed that constructions involving an intervener with number features dissimilar to the moved element were more accurately interpreted by children compared to those involving an intervener which shares similar number features with the moved element. The same pattern was also observed in the gender conditions (i.e. better performance was attested in the conditions in which the intervener and the moved element shared dissimilar gender features compared to the condition in which they shared similar features), but with a milder effect. In other words, performance in the mismatch conditions was more accurate for the number feature compared to the gender feature. Thus, it was suggested that, although intervention effects are generated by

the lexical NP within the DP, in line with Friedmann *et al.*'s (2009) claims, the DP-internal structure seems to play a significant role in the creation of these effects. In Italian, "external and syntactically active features, such as Number, reduce intervention effects compared to internal and (possibly) lexicalized features, such as Gender" (Adani *et al.*, 2010, p. 2148).

Along similar lines, Belletti, Friedmann, Brunato, and Rizzi (2012) assessed headed relative clauses (RCs) in which the moved object and the intervening subject have the same or different gender values in 62 Hebrew- and Italian-speaking children, aged from 3;9 to 5;5. The authors observed that in Hebrew, headed relative clauses in which the moved element and the intervening subject shared similar gender features were harder for children to interpret compared to counterparts in which the moved element and the intervening subject had dissimilar gender features. However, gender mismatch did not significantly affect the comprehension of relative clauses in Italian. This difference was attributed to the differential status of the gender feature in each language, namely, to the fact that gender in Hebrew, but not in Italian, is part of the featural composition of the tensed verb, hence part of the feature set attracting the subject, and thus affects the computation of intervention. In other words, Belletti *et al.* (2012) argue that intervention effects are caused by the morphosyntactic status of a feature in a given language (in line with Adani *et al.*, 2010).

Therefore, it seems that factors such as the feature specification of the intervener or the moved element can modulate the intervention/minimality effects in A'-dependencies (see also Arosio, Guasti & Stucchi, 2011; Garaffa & Grillo, 2008; for an elaborated analysis on how ANIMACY affects TD children's and agrammatic speakers' performance, respectively). In an attempt to support the feature-based approach to intervention effects, Costa, Grillo, and Lobo (2012) assessed the comprehension of headed and free relative clauses in a group of 40 European Portuguese-speaking children, aged from 4;0 to 5;11. Their findings showed that although intervention effects appear in the presence of lexical NP restriction (e.g. in the case of headed relative clauses), they are prominent even in dependencies which involve relative pronouns that lack lexical NP restriction (e.g. object free relatives). Although *wh*-pronouns such as *quem* 'who' in European Portuguese lack lexical NP restriction, they have a rich internal structure that specifies features such as Noun, +animate, +human, *wh*, which might induce minimality effects in cases of non-local movement. Therefore, the authors conclude that intervention effects can emerge even in the absence of lexical NP restriction, though in a weaker form, and that the internal feature structure of the intervener is crucially modulating these effects.

To sum up, Friedmann *et al.*'s (2009) account attempts to explain subject/object asymmetries observed in constructions that involve *wh*-movement, such as *wh*-questions and relative clauses, but at the same time captures

comprehension difficulties observed in child language even in constructions that do not involve *wh*-movement but lead to crossing dependencies (see Friedmann & Costa, 2010). Moreover, while lexical NP restriction seems to impinge on minimality effects, other features of the intervener or the moved element seem to also play a significant role in generating these effects (Adani *et al.*, 2010; Belletti *et al.*, 2012; Costa *et al.*, 2012).

In the context of these findings, the present study aims at investigating whether the predictions from Friedmann *et al.*'s (2009) version of RM can account for the comprehension patterns observed in constructions that involve *wh*-movement in the acquisition of Greek, a language that displays overt case marking in its arguments and does not linearly show intervention in non-canonical sentences (see discussion in the next section). Limited research has been conducted until now on the comprehension of constructions that involve *wh*-movement in child Greek and the results are not fully conclusive, as they do not confirm subject/object asymmetries in the various *wh*-structures. Regarding *wh*-questions, Stavrakaki (2001a) reports significantly better performance on referential (*which NP*) and non-referential (*who*) subject questions compared to object counterparts, on the basis of a group of 16 TD children, aged from 3;4 to 5;2 (mean age: 4;1), which was used as a language-matched control group to compare the comprehension of *wh*-questions in typical and atypical development. On the basis of the same control group of TD children, Stavrakaki (2001b) does not report consistent subject/object asymmetries in relative clauses. Specifically, similar performance was observed in O-O relatives (i.e. relative clauses with an object head and an object gap – our object right-branching relative clauses; see next section) and in S-S relatives (i.e. relative clauses with a subject head and a subject gap – our subject center-embedded relative clauses). However, lower performance was detected in O-S relatives (i.e. relative clauses with an object head and a subject gap – our subject right-branching relative clauses) compared to O-O (object right-branching) and S-S (subject center-embedded) relatives, and even lower in S-O relatives (relative clauses with a subject head and an object gap – our object center-embedded relative clauses) compared to all relative types. Nevertheless, no statistical analysis was performed to compare the differences in performance across these four relative types, so no firm conclusions can be drawn regarding possible subject/object asymmetries in Greek relative clauses. Moreover, Stavrakaki (2001b) reports that the TD control group's performance was facilitated by the presence of case marking. Children performed significantly better in O-O relatives in which the object head and the subject of the relative clause were marked for accusative and nominative case, respectively, as opposed to O-O relatives in which the object head and the subject of the relative clause were not morphologically marked for case, as both were neuter DPs. Nonetheless, it is not obvious that it was

case and not gender that facilitated performance in the O-O relatives with morphological case marking, because their heads and their subjects had different gender features (one was masculine and the other feminine), as opposed to the O-O relatives without morphological case marking, which involved heads and subjects with identical (namely, neuter) gender features.

To this end, we tested subject/object referential (*which NP*) and non-referential (*who*) questions and subject/object headed relative clauses, right-branching and center-embedded, to investigate whether there are indeed subject/object asymmetries in all these constructions and whether these potential asymmetries in Greek can be explained within Friedmann *et al.*'s (2009) RM account. However, based on the predictions made by Friedmann *et al.* (2009) regarding lexical NP restriction, and based on the predictions by Adani *et al.* (2010), Belletti *et al.* (2012), and Costa *et al.* (2012) regarding the effect of feature specification in causing intervention effects, we also included some structures in which the feature specification of the intervener and the moved element can be manipulated in Greek in terms of lexical NP restriction or  $\varphi$ -features. Particularly, we assessed: (a) non-referential *wh*-questions in which the *wh*-element does not inflect for gender, case, and number features (i.e. *what* questions) in order to examine the role of the  $\varphi$ -features of the moved element in intervention effects; (b) free relatives introduced by a bare *wh*-element (i.e. *whoever*) and free relatives introduced by a full DP that contained a *wh*-element and a lexical NP (i.e. *whichever NP*) in order to investigate the role of lexical NP restriction in a *wh*-structure that has not been investigated before within this context; and (c) relative clauses in which the intervening subject DP contained a quantifier (i.e. *someone*) as well as relative clauses in which the intervening subject was a DP that contained a quantifier and a lexical NP (e.g. *some NP*) in order to explore the role of feature specification and lexical NP restriction in the intervening subject.

#### THE PRESENT STUDY

The present study assesses the ability of Greek-speaking TD children to comprehend complex constructions that entail *wh*-movement, such as *wh*-questions, (restrictive) relative clauses (RC), and free relatives (FR), by means of three picture-pointing tasks, in order to examine (a) whether subject/object asymmetries are attested in these structures in a language like Greek, which marks DPs with overt/morphological case and involves verb–subject inversion in structures that are generated by *wh*-movement (see discussion below), and (b) whether intervention effects are present in the object dependencies in which the moved element and the intervener are structurally similar in terms of lexical NP restriction or in terms of other features.



### Participants

Fifty-eight monolingual Greek-speaking TD children (26 boys and 32 girls), aged from 4;0 to 6;4 (mean age: 5;4, *SD*: 0.53), took part in the experiment. No history of speech and language difficulties or any psychological, social, or emotional disturbance was reported. None of the children received any kind of medications and they were all recruited from middle/high SES public kindergartens.

### Materials–procedure

Three comprehension tasks were administered: (i) *wh*-questions, (ii) RCs, and (iii) FRs. The procedure and stimulus material (in an expanded version) for the *wh*-question task and for the RC task (specifically, for right-branching RCs) has been used in Nerantzini *et al.* (2014). All materials used are provided in the ‘Appendix’.

Regarding *wh*-questions, a total of 48 sentences in different question types were assessed: 16 non-referential *pjos/pjon* ‘who/whom’ and 16 non-referential *ti* ‘what’ questions (5), as well as 16 referential *pjos zoγrafo/pjon zoγrafo* ‘which painter’/‘which painter’ questions (6), half subject-extracted and half object-extracted in each question type. It should be pointed out that Greek presents a number of differences in its formation of *wh*-questions compared to other languages that have been previously studied. First, Greek does not distinguish lexically between *who* and *which*, unlike English (e.g. see Stromswold, 1995) or Hebrew (e.g. see Friedmann *et al.* 2009); the interrogative pronoun *pjos* is used for both question types (*pjos* ‘who’; *pjos zoγrafo* ‘which painter’). Second, unlike in English or in Hebrew, where only in the object dependencies is the *wh*-pronoun marked with accusative, the interrogative pronoun in the subject and object position is overtly inflected for nominative and accusative case, respectively, (as well as for number and gender). Namely, both non-referential (*pjos* ‘who<sub>NOM.MASC</sub>’/*pjon* ‘who<sub>ACC.MASC</sub>’) and referential questions (*pjos zoγrafo* ‘which<sub>NOM.MASC</sub> painter<sub>NOM.MASC</sub>’/*pjon zoγrafo* ‘which<sub>ACC.MASC</sub> painter<sub>ACC.MASC</sub>’) have distinct morphological forms for nominative and accusative case, at least in the case of masculine *wh*-pronouns, as feminine and neuter *wh*-pronouns do not show a morphological distinction between nominative and accusative case. Third, non-referential *pjos/pjon* ‘who’ and *ti* ‘what’ questions differ with respect to their  $\phi$ -feature properties; *pjos/pjon* is inflected for gender, case, and number features, whereas *ti* is not. Moreover, although the feature [+/-animate] distinguishes *who* and *what* questions in English (Alexopoulou & Keller, 2014), in Greek both *wh*-words can be used to refer to animate and inanimate entities, but the *wh*-word *ti* mainly refers to [–human] entities. Regarding our test sentences, in non-referential (*who*) questions, the *wh*-pronoun was always masculine and

marked for nominative case in the subject questions and for accusative case in the object questions (5). In referential questions, the *wh*-pronoun was masculine in three subject and in three object sentences, and feminine in five subject and in five object sentences, and showed distinct morphological forms for nominative and accusative only in the case of masculine NPs (6) but not in the case of feminine NPs (see relevant test sentences in the 'Appendix'). Moreover, both the subject and the object DPs in object and subject referential and non-referential questions, respectively, were marked for case (nominative for subject DPs and accusative for object DPs; see (5) and (6)).

- (5) *who* subject: *þjos kiniya ton stratioti?*  
 who\_NOM.MASC chases the soldier\_ACC.MASC  
 'Who is chasing the soldier?'
- who* object: *þjon kiniya o stratiotis?*  
 who\_ACC.MASC chases the soldier\_NOM.MASC  
 'Who is the soldier chasing?'
- what* subject: *ti kiniya ton stratioti?*  
 what chases the soldier\_ACC.MASC  
 'What is chasing the soldier?'
- what* object: *ti kiniya o stratiotis?*  
 what chases the soldier\_NOM.MASC  
 'What is the soldier chasing?'
- (6) *which-NP* subject: *þjos zoýrafos kiniya ton stratioti?*  
 which\_NOM.MASC painter\_NOM.MASC chases  
 the soldier\_ACC.MASC  
 'Which painter is chasing the soldier?'
- which-NP* object: *þjon zoýrafo kiniya o stratiotis?*  
 which\_ACC.MASC painter\_ACC.MASC chases  
 the soldier\_NOM.MASC  
 'Which painter is the soldier chasing?'

The RC task consisted of 32 relative clauses, 16 right-branching (RB) (7) and 16 center-embedded (CE) (8), half of which were subject-extracted and half object-extracted. In order to ensure that semantic cueing was eliminated, center-embedded clauses were depicted with all the agents having the same height. Again, note that in Greek the subject and the object DPs in both relative types (RB and CE) are overtly marked for case (nominative for subjects and accusative for objects; see (7) and (8)). Additionally, 8 object RCs were included in which the subject was a quantificational restrictor (*kapjos* 'someone') (objRC\_Q) (9), and 8 object RCs in which the subject was a quantificational phrase that included a quantificational restrictor and an NP (*kapjos stratiotis* 'some soldier') (objRC\_Q+NP) (10). These structures were included in our experiment because, if intervention effects are due to the presence of lexical NP restriction, in accordance with

Friedmann *et al.*'s (2009) account, an asymmetry is expected between structures in which the subject contains a quantificational restrictor and counterparts in which the subject contains a quantificational restrictor and an NP (see predictions in Table 1). The quantificational restrictor *kapjos* in Greek is inflected for case (as well as for gender and number). In our task, the objRC\_Q condition always included sentences with quantificational restrictors in masculine gender, thus overtly inflected for nominative (*kapjos* 'someone\_NOM.MASC'; see (9)). In contrast, the objRC\_Q+NP condition included three sentences with quantificational restrictors in masculine gender, overtly inflected for nominative (*kapjos stratiotis* 'whoever\_NOM.MASC soldier\_NOM.MASC'; see (10)) and five sentences with quantificational restrictors in feminine gender, where there was no morphological distinction between nominative and accusative (see relevant test sentences in the 'Appendix'). Moreover, the two DPs in all of the test sentences in our RC task were matched for gender (they were either both masculine or both feminine), unlike the DPs in the test sentences in Stavrakaki's (2001b) study.

- (7) subject RB: *δίκσε μου τον ζωραφο που κινιγα τον στρατιοτι.*  
show me the painter\_ACC.MASC that chases the  
soldier\_ACC.MASC  
'Show me the painter that is chasing the soldier.'
- object RB: *δίκσε μου τον ζωραφο που κινιγα ο στρατιοτις.*  
show me the painter\_ACC.MASC that chases the  
soldier\_NOM.MASC  
'Show me the painter that the soldier is chasing.'
- (8) subject CE: *ο ζωραφος που κινιγα τον στρατιοτι ine ψιλος. πjos ine?*  
the painter\_NOM.MASC that chases the  
soldier\_ACC.MASC is tall. who\_NOM.MASC is  
'The painter that is chasing the soldier is tall.  
Who is he?'
- object CE: *ο ζωραφος που κινιγα ο στρατιοτις ine ψιλος. πjos ine?*  
the painter\_NOM.MASC that chases the  
soldier\_NOM.MASC is tall. who\_NOM.MASC is  
'The painter that the soldier is chasing is tall.  
Who is he?'
- (9) objRC\_Q: *δίκσε μου τον ζωραφο που kapjos κινιγα.*  
show me the painter\_ACC.MASC that  
someone\_NOM.MASC chases  
'Show me the painter that someone is chasing.'
- (10) objRC\_Q+NP: *δίκσε μου τον ζωραφο που kapjos stratiotis κινιγα.*  
show me the painter\_ACC.MASC that  
some\_NOM.MASC soldier\_NOM.MASC chases  
'Show me the painter that some soldier is chasing.'

The FR task included 16 subject/object FRs with the free relative restrictor *opjon* ‘whoever’ (11), and 16 subject/object FRs with the free relative restrictor *opjon* and an NP (*opjon zoγrafo* ‘whichever painter’) (12). Notice that the free relative pronoun *opjon* ‘whoever’ is distinct from the interrogative pronoun *pjon* ‘who’ used to form *wh*-questions, and that, similarly to other pronouns in Greek, it is also inflected for case (as well as for gender and number) (*opjos* ‘whoever\_NOM.MASC’/*opjon* ‘whoever\_ACC.MASC’). Since the FR clause was the object of the main clause in the test sentences, the free relative pronoun was always inflected for accusative in both subject and object FRs because of case matching (see Alexiadou & Varlokosta, 2007; Philippaki-Warbuton & Stavrou, 1986; among others). Masculine free relative pronouns make an overt morphological distinction between nominative and accusative case, while feminine ones do not. Thus, the sentences in the condition with the free relative restrictor, which were always masculine, were overtly marked for accusative case (11), whereas the sentences including the free relative restrictor and an NP were overtly marked for accusative only in the case of the three masculine NPs (12), but not in the case of the five feminine NPs (see relevant test sentences in the ‘Appendix’).

- (11) subject - FR\_wh/whoever: *dikse mu opjon kiniya ton stratioti.*  
 show me whoever\_ACC.MASC chases  
 the soldier\_ACC.MASC  
 ‘Show me whoever is chasing  
 the soldier.’
- object - FR\_wh/whoever: *dikse mu opjon kiniya o stratiotis.*  
 show me whoever\_ACC.MASC  
 chases the  
 the soldier\_NOM.MASC  
 ‘Show me whoever the soldier  
 is chasing.’
- (12) subject - FR\_wh/whoever+NP: *dikse mu opjon zoγrafo kiniya ton stratioti.*  
 show me whoever\_ACC.MASC  
 painter\_ACC.MASC chases the  
 soldier\_ACC.MASC  
 ‘Show me whichever painter is  
 chasing the soldier.’
- object - FR\_wh/whoever+NP: *dikse mu opjon zoγrafo kiniya o stratiotis.*  
 show me whoever\_ACC.MASC  
 painter\_ACC.MASC chases the  
 soldier\_NOM.MASC  
 ‘Show me whichever painter  
 the soldier is chasing.’

As is evident in the examples above, Greek involves verb–subject inversion in constructions that are generated by *wh*-movement (for discussion of the phenomenon, see Anagnostopoulou, 1994; Kotzoglou, 2006; among others). Thus, in all three tasks, the object dependencies involved the order VS. The order SV was implemented only in the RCs with a quantificational subject (obj RC\_Q, obj RC\_Q+NP) to avoid the ambiguity that can be caused in the obj RC\_Q+NP cases with subject DPs in feminine gender; for example, *δίκσε μου τιν τίγρι που τραβά κάπια αρκούδα* can mean ‘show me the tiger that some bear is pulling’ or ‘show me the tiger that is pulling some bear’. Given the VS order, linearly, the object dependencies appear not to induce intervention/minimality effects. However, given that, under standard assumptions, the *wh*-object moves from the postverbal DP position, there is intervention in all cases, as the subject appears postverbally because of the movement of the verb from the head of the verb Phrase (vP) to a higher position, namely the Tense Phrase (TP) (e.g. Anagnostopoulou, 1994; Kotzoglou, 2006) (or to the Complementizer Phrase (CP); Tsimpli, 1995). Thus, assuming the analyses in which the verb moves to TP, the underlying structure of an object *wh*-question, such as (5), is as in (13), where the *wh*-object has moved from the postverbal position within the vP to the specifier position of CP, the verb has moved to TP, and the subject DP is in the specifier of vP. In any case, the moved *wh*-object crosses the intervening subject DP, thus, resulting in a structure that potentially could induce minimality effects.

- (13) [<sub>CP</sub> *þjon* [<sub>TP</sub> *kiniya* [<sub>vP</sub> <*o stratiotis*> *t<sub>v</sub>* <*þjon*> ]]]?  
 who\_ACC.MASC chases the soldier\_NOM.MASC  
 ‘Who is the soldier chasing?’

The same transitive action verbs and the same nouns were used across tasks in order to eliminate erroneous picture identification effects. The procedure used was also identical in all three tasks. A sentence–picture matching task was employed, in which black-and-white drawings were presented on a computer screen – one at a time – (see Figure 1), while children were orally presented with a sentence (*wh*-question/RC/FR) and were asked to point to the correct agent of the action. The drawings depicted semantically reversible actions performed by animate agents of the same gender (grammatical and semantic). The direction of the action was counterbalanced across conditions and all the experimental items were randomized across conditions in each task.

All children were tested individually. Each task was administered in a separate session within a week. All three tasks were presented in a randomized order across participants. Four practice trials were included, as well, in each task. Repetition of the cueing sentence was accepted upon



Figure 1. Experimental item.

request, although feedback as to the accuracy was not given during the task administration.

### *Predictions*

Table 1 summarizes the main predictions for the structures under investigation, based on Friedmann *et al.*'s (2009) extension of the RM approach, according to which intervention/minimality effects are modulated by the similarity of the intervener and the moved element in terms of lexical NP restriction.

Regarding *wh*-questions, referential *which-NP* questions involve a moved *wh*-phrase that contains a lexical NP. Thus, comprehension is expected to be weak in object referential questions, since both the moved object (*wh*-word +NP) and the intervening subject are lexically restricted, but not in subject referential questions, where there is no intervening subject DP. Non-referential *who* questions do not involve lexical NP restriction, and thus high performance is predicted for both subject and object conditions. Similarly, no subject/object asymmetry is expected in non-referential *what* questions, again due to the absence of lexical NP restriction in the moved element. In a similar vein, the comprehension of object RCs (right-branching or center-embedded) ought to be poor compared to the comprehension of subject ones, since in the former case both the moved element and the intervening subject involve lexical NPs. Moreover, in object RCs in which the subject is a quantificational phrase (objRC\_Q+NP), both the moved and the intervening element involve lexical NPs,

TABLE 1. *Predictions from Friedmann et al.'s (2009) approach*

Structures	Predictions
<b>Wh-questions</b>	
subject referential ( <i>which-NP</i> ) e.g. "Which doctor is pulling the athlete?"	✓
subject non-referential ( <i>who</i> ) ( <i>what</i> ) e.g. "Who/What is pulling the athlete?"	✓
object referential ( <i>which-NP</i> ) e.g. "Which doctor is the athlete pulling?"	×
object non-referential ( <i>who</i> ) ( <i>what</i> ) e.g. "Who/What is the athlete pulling?"	✓
<b>Relative clauses (RB and CE)</b>	
subject e.g. "Show me the doctor that is pulling the athlete."	✓
object e.g. "Show me the doctor that the athlete is pulling."	×
<b>Relative clauses with quantificational subject</b>	
obj RC_Q e.g. "Show me the doctor that someone is pulling."	✓
obj RC_Q+NP e.g. "Show me the doctor that some athlete is pulling."	×
<b>Free relatives</b>	
subject - FR_wh/whoever e.g. "Show me whoever is pulling the athlete."	✓
object - FR_wh/whoever e.g. "Show me whoever the athlete is pulling."	✓
subject - FR_wh/whoever+NP e.g. "Show me whichever doctor is pulling the athlete."	✓
object - FR_wh/whoever+NP e.g. "Show me whichever doctor the athlete is pulling."	×

NOTES: RB=right-branching; CE=center-embedded; FR\_wh/whoever: sentence with a free relative restrictor; FR\_wh/whoever+NP: sentence with a free relative restrictor and an NP; RC\_Q: relative clause in which the subject is a quantificational restrictor; RC\_Q+NP: relative clause in which the subject is a quantificational phrase.

so comprehension ought to be adversely affected, while in the case of object RCs in which the subject is a quantificational restrictor (objRC\_Q), performance is expected to be relatively high, due to the absence of a lexical NP. With respect to FRs, no intervention effects are predicted for sentences with a free relative restrictor (FR\_wh/whoever), since the moved element in the object condition lacks lexical NP restriction. However, poor performance is expected in the object sentences with a free relative restrictor and an NP (FR\_wh/whoever+NP), due to the presence of a lexical NP in both the moved element and the intervening subject. High performance is expected for subject-extracted sentences in both conditions (i.e. FR\_wh/whoever, FR\_wh/whoever+NP), as they do not involve an intervening DP.

TABLE 2. Overall proportions correct on *wh*-question comprehension

Structures	Predictions	Accuracy Mean%
<b><i>Wh</i>-questions</b>		
subject referential ( <i>which-NP</i> )	✓	89%
subject non-referential ( <i>who</i> )	✓	91.5%
subject non-referential ( <i>what</i> )	✓	84.4%
object referential ( <i>which-NP</i> )	×	74.3%
object non-referential ( <i>who</i> )	✓	89.4%
object non-referential ( <i>what</i> )	✓	98.2%

## RESULTS

A number of asymmetries were observed in children's performance on the interpretation of the structures under investigation. With respect to *wh*-question comprehension, children, as a group, exhibited relatively high performance across conditions, except in referential *which-NP* object questions, where a lower score was attained (see Table 2).

No significant dissociation was observed between subject- and object-extracted *who* questions ( $\chi^2(1, N=928) = 1.255, p = .263$ ). However, object questions appeared to be significantly harder than subject ones in referential *which-NP* questions ( $\chi^2(1, N=928) = 33.300, p < .001$ ; Cramer's  $V = .189$ ), whereas subject questions appeared to be significantly more difficult than object ones in *what* questions ( $\chi^2(1, N=928) = 56.030, p < .001$ ; Cramer's  $V = .246$ ). (The Cramer's  $V$  coefficient ranges from 0 to 1; usually, a Cramer's  $V$  of .10 suggests that there is a substantive relationship between the variables under investigation.) Additionally, in the subject questions, no significant difference was observed between referential *which-NP* and non-referential *who* questions ( $\chi^2(1, N=928) = 1.772, p = .183$ ), although an asymmetry was found between *who* and *what* questions ( $\chi^2(1, N=928) = 11.144, p < .001$ ; Cramer's  $V = .110$ ), in that *what* questions were less accurate than *who* questions. Importantly, in the object questions, referential *which-NP* questions were significantly harder than non-referential *who* counterparts ( $\chi^2(1, N=928) = 35.614, p < .001$ ; Cramer's  $V = .196$ ), while *who* questions were significantly more difficult than *what* questions ( $\chi^2(1, N=928) = 31.421, p < .001$ ; Cramer's  $V = .338$ ). We also investigated whether case had an impact on children's performance by analyzing separately the errors observed in referential *which-NP* questions in which the interrogative pronoun was morphologically (i.e. overtly) marked for nominative and accusative case (i.e. masculine *wh*-pronouns) and those in which it was not morphologically marked (i.e. feminine *wh*-pronouns). It turned out that case indeed affected children's performance, since more errors were obtained in referential questions that included feminine interrogative pronouns, compared to questions that included masculine



TABLE 3. *Developmental data (age groups) for wh-questions (mean %)*

Question type	4;0–5;4	5;5–6;4
<i>which</i> _NP subject	86.6	91.2
<i>which</i> _NP object	76.3	72.9
<i>who</i> _subject	89.7	93.3
<i>who</i> _object	88.3	90.4
<i>what</i> _subject	82.1	86.6
<i>what</i> _object	97.3	99.1

TABLE 4. *Overall proportions correct on RC comprehension*

Structures	Predictions	Accuracy Mean%
Relative clauses (RB and CE)		
RB-subject	✓	89.8%
CE-subject	✓	85.7%
RB-object	×	65%
CE-object	×	52.3%
Relative clauses with quantificational subject		
obj RC_Q	✓	42%
obj RC_Q+NP	×	63.1%

ones in both subject ( $\chi^2(1, N=102)=9.787, p<.001$ ; Cramer's  $V=.310$ ) and object dependencies ( $\chi^2(1, N=238)=27.189, p<.001$ ; Cramer's  $V=.246$ ). Furthermore, we investigated whether the subject/object asymmetry generally observed in referential questions was also evident in the referential questions with masculine *wh*-pronouns (which are overtly marked with nominative and accusative), as well as in those with feminine *wh*-pronouns (which are not overtly marked with case). We found that in both cases there was a significant difference between subject and object dependencies (for referential questions with masculine *wh*-pronouns:  $\chi^2(1, N=348)=4.285, p=.038$ ; Cramer's  $V=.111$ ; for referential questions with feminine *wh*-pronouns:  $\chi^2(1, N=580)=30.741, p=.000$ ; Cramer's  $V=.230$ ).

In a separate analysis, we divided our group into two age groups; group A consisted of 28 children, aged from 4;0 to 5;4 (mean age: 4;8,  $SD: 0.44$ ), and group B consisted of 30 children, aged from 5;5 to 6;4 (mean age: 5;6,  $SD: 0.28$ ). The same asymmetries were found within each age group (see Table 3; significant differences are indicated with brackets). Children's performance did not differ significantly across age groups in any condition.

In the RC comprehension task, children's performance, as a group, revealed dissociations between subject and object RCs across relative types (see Table 4).

TABLE 5. *Developmental data (age groups) for RCs (mean %)*

Sentence type	4;0–5;4	5;5–6;4
RB_subj	90.5	89.3
RB_obj	64	65.9
CE_sub	86.5	85.2
CE_obj	52.5	52.2
objRC_Q	48	39.1
objRC_Q+NP	67.7	60.8

Better performance was observed in subject compared to object dependencies in both RB ( $\chi^2(1, N=928)=81.671, p<.001$ ; Cramer's  $V=.297$ ) and CE RCs ( $\chi^2(1, N=928)=121.191, p<.001$ ; Cramer's  $V=.361$ ). Note that CE object relatives were significantly more difficult than RB object counterparts ( $\chi^2(1, N=928)=15.476, p<.001$ , Cramer's  $V=.129$ ). Additionally, the type of embedding/relative type affected children's performance; an overall difference was attested between the RB and the CE clauses, with better performance on the former relative type compared to the latter ( $\chi^2(1, N=1856)=16.740, p<.001$ ; Cramer's  $V=.095$ ). Last, object RCs in which the subject included a quantificational restrictor (objRC\_Q) were significantly harder compared to those in which the subject included a quantificational phrase (objRC\_Q+NP) ( $\chi^2(1, N=928)=41.508, p<.001$ ; Cramer's  $V=.211$ ). Again, to investigate the effect of case on children's performance, we analyzed the error patterns attested in the RCs in which the quantificational restrictor was overtly inflected for nominative case (i.e. masculine subjects in objRC\_Q+NP sentences) and those in which it was not (i.e. feminine subjects in objRC\_Q+NP sentences). Morphological marking affected children's performance, since more errors were obtained in cases where the quantificational restrictor was not overtly marked for nominative (i.e. feminine subjects) compared to cases in which it was overtly marked for case (i.e. masculine subjects) ( $\chi^2(1, N=342)=8.614, p<.001$ ; Cramer's  $V=.159$ ).

A separate analysis with the two age groups was also conducted. The same asymmetries were found within each age group (see Table 5; significant differences are indicated with brackets). Children's performance did not differ significantly across age groups in any condition.

Turning to the FR comprehension task, overall, children again showed selective difficulties (see Table 6).

While no significant difference was attested between subject- and object-extracted clauses with a free relative restrictor (FR\_wh/whoever) ( $\chi^2(1, N=928)=0.044, p=.834$ ), a significant subject/object difference was observed in the condition where a free relative restrictor and an NP were

TABLE 6. Overall proportions correct on FR comprehension

Structures	Predictions	Accuracy Mean%
Free relatives		
subject - FR_wh/whoever	✓	89.2%
object - FR_wh/whoever	✓	88.7%
subject - FR_wh/whoever+NP	✓	84.6%
object - FR_wh/whoever+NP	×	77.8%

included (FR\_wh/whoever+NP) ( $\chi^2(1, N=928)=7.243, p=.007$ ; Cramer's  $V=.088$ ). Moreover, better performance was observed in object FRs without an NP compared to those with an NP ( $\chi^2(1, N=928)=20.145, p<.001$ ; Cramer's  $V=.147$ ). To investigate the effect of case on children's performance, we analyzed the error patterns attested in the sentences with the free relative restrictor and an NP, namely, those in which the free relative restrictor was overtly inflected for accusative case (i.e. masculine pronouns) and those in which it was not (i.e. feminine pronouns). In the case of object dependencies, more errors were obtained in the sentences in which the free relative pronoun was not overtly marked for accusative case (i.e. feminine pronouns) compared to those in which it was overtly marked for case (i.e. masculine pronouns) ( $\chi^2(1, N=206)=10.334, p<.001$ ; Cramer's  $V=.224$ ). However, in the case of subject dependencies, more errors were attested in the sentences with masculine pronouns compared to those with feminine pronouns ( $\chi^2(1, N=142)=9.443, p<.001$ ; Cramer's  $V=.258$ ). Additionally, we investigated whether the subject/object asymmetry generally observed in FRs with a free relative restrictor and an NP (FR\_wh/whoever+NP) was also evident in the FR\_wh/whoever+NP clauses with a masculine free relative pronoun (which is overtly marked with accusative—due to case matching), as well as in those with a feminine free relative pronoun (which are not overtly marked for case). The statistical analysis revealed that although the difference between subject and object dependencies in the FR clauses with masculine pronouns was not significant ( $\chi^2(1, N=348)=3.276, p=.070$ ; Cramer's  $V=.097$ ), it turned out to be significant for the FR clauses with feminine pronouns ( $\chi^2(1, N=580)=22.561, p=.000$ ; Cramer's  $V=.197$ ).

Subject/object asymmetries were also attested in a separate analysis within each age group (see Table 7; significant differences are indicated with brackets), although the subject/object asymmetry in the condition where a free relative restrictor and an NP were included (FR\_wh/whoever+NP) did not reach significance in the second age group ( $\chi^2(1, N=624)=3.167, p=.075$ ). Children's performance did not differ across age groups in any condition, except from the condition of object extracted clauses with a free relative

TABLE 7. *Developmental data (age groups) for FRs (mean %)*

Sentence type	4;0–5;4	5;5–6;4
subject-FR <sub>wh/whoever</sub>	88.1	89.7
object-FR <sub>wh/whoever</sub>	82.8	91.6
subject-FR <sub>wh/whoever</sub> +NP	84.2	84.9
object-FR <sub>wh/whoever</sub> +NP	74.3	79.4

restrictor (FR<sub>wh/whoever</sub>), where a significantly better performance was attested in the older age group ( $\chi^2(1, N=464)=7.903, p=.005$ ; Cramer's  $V=.131$ ).

## DISCUSSION

The present study investigated the ability of Greek-speaking TD children to comprehend complex constructions that entail *wh*-movement, such as *wh*-questions, RCs, and FRs. Several asymmetries were revealed across conditions.

Regarding *wh*-questions, although children as a group performed relatively highly across conditions, they faced more difficulties interpreting referential *which-NP* object questions. A subject/object asymmetry was observed in referential *which-NP* questions and in non-referential *what* questions, but not in non-referential *who* questions. This is not in line with previous findings on Greek, which report subject/object asymmetries in both referential and non-referential *who*-questions (see Stavrakaki, 2001a). One could argue that the discrepancy between the findings of the two studies is due to the age difference between the children in our study (their mean age was 5;4) and those in Stavrakaki (2001a) (their mean age was 4;1). However, the fact that the pattern of asymmetries is identical in the two age groups of our study (i.e. in the four-year-olds, which is the age group that has similar mean age as the TD group in the Stavrakaki, 2001a, study, and in the five-year-olds) indicates that the asymmetry between referential vs. non-referential *who* questions in our study is a genuine asymmetry, which did not surface in Stavrakaki's (2001a) study, probably because of the small sample size. Moreover, the *wh*-comprehension data revealed two important findings: (a) the subject non-referential *who* questions were better interpreted compared to the subject non-referential *what* counterparts, and (b) besides the asymmetry between object referential *which-NP* questions and object non-referential *who* counterparts, an asymmetry was also found between object *who* and object *what* questions.

With respect to RC comprehension, children presented subject/object asymmetries across relative types. Specifically, better performance was observed in subject compared to object dependencies in both right-branching and center-embedded RCs. Note that the subject/object

asymmetry attested in the right-branching RCs is in contrast to the patterns observed in Stavrakaki (2001b), where better performance was attested in O-O relatives (our object right-branching RCs) compared O-S relatives (our subject right-branching RCs). However, no statistical analysis was performed in Stavrakaki (2001a) to confirm the O-O vs. O-S asymmetry. Additionally, the type of embedding had an impact on children's overall interpretation of RCs; a difference in the interpretation of right-branching and center-embedded RCs was observed with the latter being harder, especially in the object condition. A similar effect was also attested in Stavrakaki's (2001b) data, namely, S-O relatives obtained low accuracy scores compared to all other relatives (although this asymmetry was also not confirmed by a statistical analysis). Regarding object RCs in which the features of the intervening subject were manipulated, an asymmetry was observed between those in which the subject included a quantificational restrictor (objRC\_Q) and those in which the subject included a quantificational phrase (objRC\_Q+NP), with the latter being better comprehended by children.

Last, our data from the FR comprehension task revealed a subject/object asymmetry in FRs where a free relative restrictor and an NP were included, while no such asymmetry was attested between subject- and object-extracted FRs with a free relative restrictor. Moreover, our data revealed a dissociation between object FRs with an NP and those without an NP (FR\_who/whoever +NP-object vs. FR\_who/whoever-object), with the latter being better preserved.

Let us now turn to the predictions of RM to see whether the patterns obtained in our data can be efficiently accommodated by this account. Table 8 summarizes our findings along with Friedmann *et al.*'s (2009) predictions.

As shown in Table 8, the predictions within the extended version of the RM approach, proposed by Friedmann *et al.* (2009), are confirmed by our data to a great extent. There are, however, some findings which cannot be straightforwardly accommodated within this account. More specifically, the main claim that comprehension will be compromised when both the intervening subject and the moved A'-element in object-extracted constructions like *wh*-questions, RCs, or FRs, contain a lexical NP, was supported by the child Greek data. Nevertheless, the asymmetry between object *who* and object *what* questions is not predicted by Friedmann *et al.*'s (2009) RM approach. Moreover, lexical NP restriction does not explain the pattern observed in object RCs with a quantificational subject, since lack of lexical NP restriction in these structures caused more difficulties to children than its presence.

Consistent with Friedmann *et al.*'s (2009) predictions, our data from *wh*-questions revealed comprehension difficulties in object referential *which-NP* questions compared to subject referential *which-NP* counterparts and object non-referential *who* questions. This finding corroborates the

TABLE 8. *Predictions from Friedmann et al.'s (2009) account and findings*

Structures	Predictions	Findings
<b>Wh-questions</b>		
subject referential ( <i>which-NP</i> )	✓	confirmed
subject non-referential ( <i>who</i> ) ( <i>what</i> )	✓	confirmed <sup>1</sup>
object referential ( <i>which-NP</i> )	×	confirmed
object non-referential ( <i>who</i> ) ( <i>what</i> )	✓	confirmed <sup>2</sup>
<b>Relative clauses (RB and CE)</b>		
subject	✓	confirmed
object	×	confirmed
<b>Relative clauses with quantificational subject</b>		
obj RC_Q	✓	disproved
obj RC_Q+NP	×	disproved <sup>3</sup>
<b>Free relatives</b>		
subject - FR_wh/whoever	✓	confirmed
object - FR_wh/whoever	✓	confirmed
subject - FR_wh/whoever+NP	✓	confirmed
object - FR_wh/whoever+NP	×	confirmed

NOTES: RB=right-branching; CE=center-embedded; FR\_wh/whoever: sentence with a free relative restrictor; FR\_wh/whoever+NP: sentence with a free relative restrictor and an NP; RC\_Q: relative clause in which the subject is a quantificational restrictor; RC\_Q+NP: relative clause in which the subject is a quantificational phrase.

<sup>1</sup> However, although high accuracy scores were revealed in subject non-referential *who* and *what* questions, an asymmetry was found between them, in that performance on subject *what* questions was significantly lower than performance on subject *who* questions (see discussion in this section).

<sup>2</sup> Likewise, despite the high accuracy scores attained in object non-referential *who* and *what* questions, object *what* questions received significantly higher scores than object *who* questions (see discussion in this section).

<sup>3</sup> Although low performance was observed in the RC condition with a quantificational phrase (obj RC\_Q+NP), Friedmann *et al.*'s account predicts worse performance in this condition compared to the RC condition with a quantificational restrictor (obj RC\_Q) (see discussion in this section).

extended version of RM, since object referential questions involve movement from a postverbal position (see structure (13) in the previous section), and both the moved element and the intervening subject DP are lexically restricted, thus resulting in intervention/minimality effects. However, if the presence of lexical NP restriction in the moved *wh*-phrase was, in fact, the only source of the comprehension difficulties that children have, no difference would be predicted between object non-referential *who* and *what* questions, since both constructions lack lexical NP restriction. Nonetheless, an advantage of object *what* over object *who* questions was attested in the data. This asymmetry remains unaccounted for on Friedmann *et al.*'s (2009) account, since both *who* and *what* object constructions involve *wh*-movement in which the intervening subject DP is lexically specified, while the moved *wh*-word is not. This asymmetry has also been observed in agrammatic




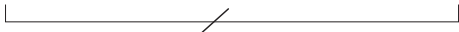
With respect to FRs, our data are consistent with Friedmann *et al.*'s (2009) account. A subject/object asymmetry was attested in FRs in which the moved DP included a free relative restrictor and a lexical NP (FR\_wh/whoever+NP), suggesting that, in line with Friedmann *et al.*'s predictions, an intervener can block chain formation when it is similar in terms of lexical NP restriction to the moved element. In contrast, an intervening subject DP does not block chain formation in the case of FRs without a lexical NP (FR\_wh/whoever); the dissimilarity in terms of lexical NP restriction between the moved element and the intervening subject DP leads to high performance in object-extracted sentences, further supporting Friedmann *et al.*'s account. The dissociation attested between object FRs with a lexical NP and object FRs without a lexical NP in the moved DP further supports the claim that the involvement of a lexically restricted intervener deteriorates children's performance.

Challenging the efficacy of that account, though, poor performance was attested in object RCs in which the intervening subject is a quantificational restrictor (objRC\_Q), as well as those in which the intervening subject is a quantificational phrase (objRC\_Q+NP). Note that Friedmann *et al.* (2009) showed that in RC conditions where the intervening subject was an arbitrary *pro*, and thus had no lexical NP restriction, no minimality effects were obtained. However, they acknowledge the fact that the lack of intervention effects in this case may not be due to the absence of lexical NP restriction but to the null nature of the subject *pro*. In the light of this finding, we included in our study object RC conditions with a quantificational restrictor (objRC\_Q) to assess whether there are minimality effects in the absence of lexical NP restriction in the intervening subject but in the presence of a quantificational operator, such as *kapjos* 'some'. Moreover, we included object RC conditions with a quantificational phrase (objRC\_Q+NP) to assess whether the presence of a lexical NP in the intervening quantificational subject creates additional comprehension difficulties for children. Contra Friedmann *et al.*'s (2009) predictions, object RCs with a quantificational restrictor (objRC\_Q), namely, structures that include subjects without lexical NP restriction, were found to be harder for children to interpret than those involving a quantificational phrase (objRC\_Q+NP), namely, structures that include subjects with lexical NP restriction. The poor performance observed in our data in the condition of object RCs in which the subject was a quantificational restrictor (objRC\_Q) suggests that the lexical restriction of the subject is not the critical factor for intervention effects. Instead, we argue that the feature specification of the intervening quantificational subject DP in both objRC\_Q and objRC\_Q+NP conditions, and the fact that both the moved and the intervening element in these conditions contain quantificational features, causes difficulties in children's comprehension. According to the RM approach to intervention effects



developed in Grillo (2005, 2008, 2009), and subsequently advocated by Costa *et al.* (2012), in order for a speaker to distinguish between a moved and an intervening DP, s/he must activate, select, and maintain the activation of the feature structure of both DPs. This has a processing cost, which depends, among other things, on the complexity of the associated semantic representation and on the position of each feature in the hierarchy of morphosyntactic features. This entails that “the more features required to distinguish between the moved and the intervening DP, the higher the processing cost” (Costa *et al.*, 2012, p. 145). We conjecture that the poor performance observed in our RC conditions with an intervening quantificational subject was due to the features involved in the intervening quantificational subject DP, which induced in turn a structural (and possibly a semantic) complexity that increased processing load, because a quantificational element with a rich internal structure is intervening in the path of a quantificational movement (i.e. between a moved A'-element and its trace/copy). Specifically, the quantificational subjects *kapjos* ‘some’ and *kapjos stratiotis* ‘some soldier’ have a richer internal structure compared to the internal structure of subject DPs, such as *o stratiotis* ‘the soldier’, used in the non-quantificational RC conditions. Their internal structure includes argumental features such as case, number, and gender. Moreover, the element *kapjos* in Greek is an indefinite quantificational restrictor that has been argued to be ambiguous between a specific and a non-specific reading (Veloudis, 1982). Thus, its internal structure specifies further features, such as indefinite specific or indefinite non-specific. If reduced processing resources, due to the additional features required to distinguish between the moved and the intervening quantificational DP in objRC\_Q and objRC\_Q+NP structures, make it impossible to activate (or maintain) the full array of features in these structures, their syntactic representation gets impoverished, resulting in an underspecified representation of the intervening DP, which generates a minimality effect, since it does not allow the construction of the relevant chain between the moved *wh*-element and its trace/copy. We assume, based on Grillo (2005, 2009), that the impoverished representation of an objRC\_Q structure such as (15) looks like (16) (similar representations hold for objRC\_Q+NP structures).

(15) (N,  $\theta_2, \varphi_s, \text{acc}, \text{wh}$ )<sub>ClassQ</sub> (D, N,  $\theta_1, \varphi_s, \text{nom}, \text{quantifier}, \text{non-specific}$ )<sub>ClassQ</sub> (N,  $\theta_2, \varphi_s, \text{wh}$ )<sub>ClassQ</sub>  
 the painter<sub>i</sub> [[who <painter>]<sub>i</sub> [ someone]<sub>j</sub> [<someone><sub>j</sub> is chasing <who painter><sub>i</sub>]]  


(16) (N,  $\theta_2, \varphi_s, \text{acc}, \text{wh}$ )<sub>ClassQ</sub> (N,  $\theta_2, \varphi_s, \text{quantifier}$ )<sub>ClassQ</sub> (D, N,  $\theta_2, \varphi_s, \text{wh}$ )<sub>ClassQ</sub>  
 the painter<sub>i</sub> [[who < . . . >]<sub>i</sub> [ someone]<sub>j</sub> [< . . . ><sub>j</sub> is chasing < . . . ><sub>i</sub>]]  


An anonymous reviewer raised the issue that since it is known that some quantificational structures may be difficult for children, one needs to know whether the difficulties observed in the sentences with quantificational subjects in the current study are due to the feature specification of these quantifiers or to a general delay in their comprehension. Although difficulties have been observed with the ‘inferred’ meaning of existential quantifiers (e.g. that ‘some’ implies ‘not all’; Noveck, 2001; Papafragou & Musolino, 2003, for the Greek quantifier *meriki* ‘some’), what is crucial for our purposes is that existential quantifiers are among the first ones to be acquired cross-linguistically (Hanlon, 1988) and that difficulties do not arise with their ‘semantic/logical’ meaning (i.e. with the meaning that *some* means ‘at least one’). Even though there are no studies on the acquisition of *kapjos* ‘some’ in Greek, Pouscoulous, Noveck, Politzer, and Bastide (2007) show that four-year-old French-speaking children have perfect mastery of the ‘semantic/logical’ meaning of *certain* ‘some’ (i.e. they know that *certain* means ‘at least one’), even though they have not mastered the ‘inferred’ meaning at adult-like rates. Given that in our experiment only the ‘semantic/logical’ meaning of *kapjos* ‘some’ was available (e.g. for the sentences *dikse mu ton zoyrafo pu kapjos kiniya* ‘show me the painter that someone is chasing’ and *dikse mu ton zoyrafo pu kapjos stratiotis kiniya* ‘show me the painter that some soldier is chasing’, there was one soldier depicted in the figure), it is reasonable to conclude that the difficulties we observed in the RC conditions with quantificational subjects are due to their impoverished syntactic representation, because of the features involved in the intervening quantificational subject DP in these conditions.

If our explanation regarding the poor performance in object RCs with a quantificational intervening subject is on the right track, there is still an issue that needs further clarification, namely, why object RCs with a quantificational restrictor (objRC\_Q) were harder to comprehend than object RCs with a quantificational phrase (objRC\_Q+NP) or other object RCs examined in the study. Recall that the proportion of correct responses for objRC\_Q was 42%, as opposed to 63.1% for objRC\_Q+NP, 65% for object right-branching RCs, and 52.3% for object center-embedded RCs. It has been proposed that *kapjos* is considered to be an anti-specific indefinite which is REFERENTIALLY VAGUE, i.e. it is used when the speaker does not have a fixed value in mind (Giannakidou & Quer, 2013). Experimental data confirm this claim, in that Greek native speakers do not prefer to use *kapjos* in specific contexts (Giannakidou, Papadopoulou & Stavrou, 2012). Hence, Greek children may have experienced difficulties with the interpretation of *kapjos* in our experimental sentences because a specific reading of the quantificational restrictor *kapjos* is required in them. In other words, the use of an anti-specific noun in specific positions, such as the preverbal subject position in our experimental conditions, creates a semantic/pragmatic

conflict for children, possibly because of their reduced processing resources. As a result of this conflict, children performed very poorly in RCs with the indefinite quantificational restrictor *kapjos* in the preverbal subject position. This line of reasoning predicts that performance should improve in RC conditions in which the anti-specific indefinite *kapjos* appears in the postverbal subject position (e.g. *dikse mu ton zoγrafo pu kiniya kapjos* instead of *dikse mu ton zoγrafo pu kapjos kiniya* ‘show me the painter that someone is chasing’), which is a position more consistent with anti-specificity (Anastasia Giannakidou; personal communication). Moreover, if this line of reasoning is in the right direction, it raises the question why structures involving a quantificational restrictor and an NP (objRC\_Q+NP) turned out to be easier for children compared to structures involving only a quantificational restrictor (objRC\_Q). We conjecture that structures involving a quantificational phrase, although referentially vague, also generate a domain restriction, which creates more informative sentences (Anastasia Giannakidou; personal communication). Hence, these structures are easier to comprehend compared to objRC\_Q structures because the NP aids children to attribute a specific reading to *kapjos* in a position that enforces a specific reading in any case, such as the preverbal subject position. To sum up, children’s low performance on object RC conditions with a quantificational restrictor or a quantificational restrictor and an NP was attributed to the feature specification of the intervening quantificational subject DP, which triggers an impoverished/underspecified representation due to reduced processing resources that children have. Nonetheless, it was argued that the position of the intervening quantificational subject, namely, the preverbal subject position, also contributed to the very low performance observed in object RCs with a quantificational restrictor (which, in fact, was lower compared to the performance observed in the other object RC conditions), since it imposed a specific reading to a quantificational element that has an anti-specific meaning. We leave open for future research the question whether performance will improve in object RCs with the quantificational restrictor *kapjos* in postverbal subject positions.

The last issue we would like to address concerns the effect of case marking in facilitating children’s comprehension of various structures involving *wh*-movement, such as *wh*-questions, RCs, and FRs. We found that case affected children’s performance, since more errors were observed in the following instances: (a) in referential questions which included feminine interrogative pronouns (i.e. those without overt/morphological case marking), compared to referential questions which included masculine ones (i.e. those with overt case) in both subject and object dependencies; (b) in object RCs with a quantificational DP in which the quantificational subject restrictor was marked for feminine gender, and thus was not overtly marked for nominative, compared to object RCs in which the

quantificational subject restrictor was marked for masculine gender, and thus was overtly marked for nominative case; and (c) in object FRs in which the free relative pronoun was marked for feminine gender, and thus was not overtly marked for accusative case, compared to object FRs in which the free relative pronoun was marked for masculine gender, and thus was overtly marked for case. These findings provide evidence for the claim that case facilitates children's comprehension of subject/object dependencies in languages, like Greek, that mark their arguments with morphological case. In fact, it was shown that case facilitates not only the comprehension of subject/object dependencies in RCs, as also shown in Stavrakaki (2001b), but also the comprehension of subject/object dependencies in other structures that involve *wh*-movement, such as *wh*-questions and FRs. Recall that Stavrakaki (2001a) argued that children's performance improved considerably in RCs in which the head and the subject of the RC were marked for case (accusative and nominative), as opposed to RCs in which the object head and the subject of the RC were not marked for case, since they were both neuter DPs. As noted before, though, it is not obvious that it was case and not gender that facilitated performance in the relatives with non-neuter nouns, because their heads and their subjects had different gender features (one was masculine and the other feminine). In our study, the head and the subject of object RCs were marked with identical gender values (i.e. either both masculine or both feminine). Similarly, the *wh*-pronoun in the referential *wh*-questions and the free relative pronoun in the FRs with a free relative pronoun and an NP were marked with identical gender values (i.e. both masculine or both feminine). Thus, our study provides new and more robust evidence compared to previous studies that case facilitates the interpretation of object dependencies, since higher accuracy was observed in the structures that involved arguments with masculine gender, where case is overtly marked.

An anonymous reviewer raised the question of in what way Case features are active by the time the sentences are processed, since Case features are supposed to be eliminated during the course of the derivation, as a result of checking. We follow the well-known distinction between abstract (syntactic) Case and morphological case (see Harley, 1995; Marantz, 1991). In the present study we are concerned with morphological case, which is the realization of abstract Case at the level of Phonetic Form (PF), hence accessible to the speaker at the time the sentences are processed. Moreover, note that within current assumptions in the Minimalist Program, checking of uninterpretable Case (and  $\phi$ -) features leads to their valuation at PF (see Chomsky, 2001, and the literature building on the notion of valuation as a result of checking).

If the claim that morphological case facilitates children's comprehension is on the right track, there are two remaining issues that need

further discussion. First, why were more errors attained in the sentences with overt case marking (i.e. those with masculine pronouns) compared to the sentences without overt case marking (i.e. those with feminine pronouns) in the case of FRs with a subject dependency? We conjecture that the pattern observed in FRs with subject dependencies was due to the case matching required in these structures (for discussion on case matching in Greek FRs, see Alexiadou & Varlokosta, 2007; Philippaki-Warbuton & Stavrou, 1986; among others). In particular, the fact that the relative pronoun was marked with accusative, as the object argument of the main verb, although it was associated with the subject position of the FR, possibly created a conflict for the children, leading them to more errors in the FR clauses with DPs marked with masculine gender. In contrast, the unmarked for case relative pronoun in the FR clauses that contained DPs with feminine gender value facilitated children's association of the relative pronoun with the subject position of the FR clause. Case matching is also the reason why subject/object asymmetries were not attested in FR clauses that contained DPs with masculine gender value, as opposed to those that contained DPs with feminine gender value. Again, the fact that the relative pronoun was marked with accusative case in the FRs with masculine DPs, although it was associated with the subject position of the FR, possibly diminished children's performance in FRs with a subject dependency, thus minimizing the difference in performance between subject and object dependencies.

The second issue that calls for further discussion is whether there are indeed genuine minimality effects in non-canonical structures in a language that marks its arguments with case, given the evidence we found that case acts as a facilitator to reduce these effects. We argue that there are genuine minimality effects, despite the fact that case facilitates the comprehension of non-canonical structures. First, subject/object asymmetries arose in right-branching and center-embedded RCs, although both arguments in these structures were marked with overt case (nominative for subjects, accusative for objects). Second, even though one could argue that the lack of subject/object asymmetries in non-referential *who* questions was not due to the absence of lexical NP restriction, as we claimed within Friedmann *et al.*'s (2009) RM approach, but was a result of the presence of case in the moved and in the intervening argument, the subject/object asymmetry observed in the referential questions with masculine *wh*-pronouns (i.e. pronouns marked with overt case) indicates that, despite the presence of case, minimality effects do arise in *wh*-questions.

To recapitulate, in the present study we assessed how children comprehend subject and object dependencies in structures that involve *wh*-movement (*wh*-questions, RCs, FRs), in order to investigate whether Friedmann *et al.*'s (2009) predictions regarding minimality effects can be confirmed in Greek, a language that displays overt/morphological case

marking in its arguments and does not linearly show intervention in non-canonical sentences. Driven by the aforementioned findings, we argued that Friedmann *et al.*'s (2009) RM approach offers an adequate account for children's performance to a great extent. More specifically, lexical NP restriction seems to have an impact on the comprehension of object dependencies in structures that involve *wh*-movement. However, lexical NP restriction per se cannot provide an account for the entire dataset we presented here. In fact, we showed that the internal structure (i.e. the feature specification) of the moved element and the intervener affect children's comprehension, which is in line with recent findings by Adani *et al.* (2010), Costa *et al.* (2012), and with the version of the RM approach developed in Grillo (2005, 2008, 2009). Thus, we conclude that although intervention effects emerge in the presence of lexical restriction, they also depend on the feature specification of the moved or the intervening element, as shown in the case of *what* questions and in the case of object RCs with a quantificational subject. Last, we argued that although case facilitates children's comprehension in languages that mark their arguments with overt/morphological case, genuine minimality effects still arise in non-canonical structures.

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## APPENDIX: Test sentences

(Only distinct nominative and accusative case marking is indicated in the sentences.)

**Which-N Subject Questions**Masculine *which-NP* phrase (*wh*-word and NP) & Masculine DP Object

1. Pjos jatros trava ton aθliti  
Which-NOM doctor-NOM pulls the-ACC athlete-ACC  
'Which doctor is pulling the athlete?'
2. Pjos zoγrafos kiniya ton stratioti  
Which-NOM painter-NOM chases the-ACC soldier-ACC  
'Which painter is chasing the soldier?'
3. Pjos vasilias fotoγrafizi ton kloun  
Which-NOM king-NOM photographs the-ACC clown  
'Which king is photographing the clown?'

Feminine *which-NP* phrase (*wh*-word and NP) & Feminine DP Object

4. Pja yineka sproxni tin mayirisa  
Which woman pushes the-ACC cook  
'Which woman is pushing the cook?'
5. Pja γata kitai tin papja  
Which cat looks at the-ACC duck  
'Which cat is looking at the duck?'
6. Pja tiyris klotsai tin arkuða  
Which tiger kicks the-ACC bear  
'Which tiger is kicking the bear?'
7. Pja yineka pleni tin mayirisa  
Which woman washes the-ACC cook  
'Which woman is washing the cook?'
8. Pja alepu δagoni tin papja  
Which fox bites the-ACC duck  
'Which fox is biting the duck?'

**Which-N Object Questions**Masculine *which-NP* phrase (*wh*-word and NP) & Masculine DP Subject

1. Pjon jatro trava o aθlitis  
Which-ACC doctor-ACC pulls the-NOM athlete-NOM  
'Which doctor is the athlete pulling?'
2. Pjon zoγrafo kiniya o stratiotis  
Which-ACC painter-ACC chases the-NOM soldier-NOM  
'Which painter is the soldier chasing?'

3. Pjon vasilia fotoɣrafizi o kloun  
Which-ACC king-ACC photographs the-NOM clown  
'Which king is the clown photographing?'

Feminine *which-NP* phrase (*wh*-word and NP) & Feminine DP Object

4. Pja yineka sproxni i maɣirisa  
Which woman pushes the-NOM cook  
'Which woman is the cook pushing?'
5. Pja ɣata kitai i papja  
Which cat looks at the-NOM duck  
'Which cat is the duck looking at?'
6. Pja tiɣri klotsai i arkuða  
Which tiger kicks the-NOM bear  
'Which tiger is the bear kicking?'
7. Pja yineka pleni i maɣirisa  
Which woman washes the-NOM cook  
'Which woman is the cook washing?'
8. Pja alepu δagoni i papja  
Which fox bites the-NOM duck  
'Which fox is the duck biting?'

**Who Subject Questions**

Masculine *wh*-word & Masculine DP Object

1. Pjos trava ton aθliti  
Who-NOM pulls the-ACC athlete-ACC  
'Who is pulling the athlete?'
2. Pjos kiniɣa ton stratioti  
Who-NOM chases the-ACC soldier-ACC  
'Who is chasing the soldier?'
3. Pjos fotoɣrafizi ton kloun  
Who-NOM photographs the-ACC clown  
'Who is photographing the clown?'

Masculine *wh*-word & Feminine DP Object

4. Pjos sproxni tin maɣirisa  
Who-NOM pushes the-ACC cook  
'Who is pushing the cook?'
5. Pjos kitai tin papja  
Who-NOM looks at the-ACC duck  
'Who is looking at the duck?'
6. Pjos klotsai tin arkuða  
Who-NOM kicks the-ACC bear  
'Who is kicking the bear?'

7. Pjos pleni tin maʔirisa  
Who-NOM washes the-ACC cook  
'Who is washing the cook?'
8. Pjos ʔagoni tin papja  
Who-NOM bites the-ACC duck  
'Who is biting the duck?'

### **Who Object Questions**

#### Masculine *wh*-word & Masculine DP Subject

1. Pjon trava o aθlitis  
Who-ACC pulls the-NOM athlete-NOM  
'Who is the athlete pulling?'
2. Pjon kiniʔa o stratiotis  
Who-ACC chases the-NOM soldier-NOM  
'Who is the soldier chasing?'
3. Pjon fotoʔrafizi o kloun  
Who-ACC photographs the-NOM clown  
'Who is the clown photographing?'

#### Masculine *wh*-word & Feminine DP Subject

4. Pjon sproxni i maʔirisa  
Who-ACC pushes the-NOM cook  
'Who is the cook pushing?'
5. Pjon kitai i papja  
Who-ACC looks at the-NOM duck  
'Who is the duck looking at?'
6. Pjon klotsai i arkuða  
Who-ACC kicks the-NOM bear  
'Who is the bear kicking?'
7. Pjon pleni i maʔirisa  
Who-ACC washes the-NOM cook  
'Who is the cook washing?'
8. Pjon ʔagoni i papja  
Who-ACC bites the-NOM duck  
'Who is the duck biting?'

### **What Subject Questions**

1. Ti trava ton aθliti  
What pulls the-ACC athlete-ACC  
'What is pulling the athlete?'

2. Ti kiniya ton stratioti  
What chases the-ACC soldier-ACC  
'What is chasing the soldier?'
3. Ti fotoğrafizi ton kloun  
What photographs the-ACC clown  
'What is photographing the clown?'
4. Ti sproxni tin maýirisa  
What pushes the-ACC cook  
'What is pushing the cook?'
5. Ti kitai tin papja  
What looks at the-ACC duck  
'What is looking at the duck?'
6. Ti klotsai ton astinomo  
What kicks the-ACC policeman-ACC  
'What is kicking the policeman?'
7. Ti pleni tin maýirisa  
What washes the-ACC cook  
'What is washing the cook?'
8. Ti ðagoni ton jatro  
What bites the-ACC doctor-ACC  
'What is biting the doctor?'

### ***What Object Questions***

1. Ti trava o aθlitis  
What pulls the-NOM athlete-NOM  
'What is the athlete pulling?'
2. Ti kiniya o stratiotis  
What chases the-NOM soldier-NOM  
'What is the soldier chasing?'
3. Ti fotoğrafizi o kloun  
What photographs the-NOM clown  
'What is the clown photographing?'
4. Ti sproxni i maýirisa  
What pushes the-NOM cook  
'What is the cook pushing?'
5. Ti kitai i papja  
What looks at the-NOM duck  
'What is the duck looking at?'
6. Ti klotsai o astinomos  
What kicks the-NOM policeman-NOM  
'What is the policeman kicking?'

7. *Ti pleni i maʻirisa*  
What washes the-NOM cook  
'What is the cook washing?'
8. *Ti ʻḍagoni o jatros*  
What bites the-NOM doctor-NOM  
'What is the doctor biting?'

### Right-Branching Subject Relative Clauses

#### Masculine DPs

1. *ʻḍikse mu ton jatros pu trava ton aʻḥliti*  
Show me the-ACC doctor-ACC that pulls the-ACC athlete-ACC  
'Show me the doctor that is pulling the athlete'
2. *ʻḍikse mu ton zoʻrafo pu kiniʻya ton stratioti*  
Show me the-ACC painter-ACC that chases the-ACC soldier-ACC  
'Show me the painter that is chasing the soldier'
3. *ʻḍikse mu ton vasilia pu fotoʻrafizi ton kloun*  
Show me the-ACC king-ACC that photographs the-ACC clown  
'Show me the king that is photographing the clown'

#### Feminine DPs

4. *ʻḍikse mu tin ʻyineka pu sproʻxni tin maʻirisa*  
Show me the-ACC woman that pushes the-ACC cook  
'Show me the woman that is pushing the cook'
5. *ʻḍikse mu tin ʻyata pu kitai tin papja*  
Show me the-ACC cat that looks at the-ACC duck  
'Show me the cat that is looking at the duck'
6. *ʻḍikse mu tin tiʻri pu klotsai tin arkuʻḍa*  
Show me the-ACC tiger that kicks the-ACC bear  
'Show me the tiger that is kicking the bear'
7. *ʻḍikse mu tin ʻyineka pu pleni tin maʻirisa*  
Show me the-ACC woman that washes the-ACC cook  
'Show me the woman that is washing the cook'
8. *ʻḍikse mu tin alepu pu ʻḍagoni tin papja*  
Show me the-ACC fox that bites the-ACC-ACC duck  
'Show me the fox that is biting the duck'

### Right-Branching Object Relative Clauses

#### Masculine DPs

1. *ʻḍikse mu ton jatros pu trava o aʻḥliti*  
Show me the-ACC doctor-ACC that pulls the-NOM athlete-NOM  
'Show me the doctor that the athlete is pulling'

2. *ðikse mu ton zoγrafo pu kiniya o stratiotis*  
Show me the-ACC painter-ACC that chases the-NOM soldier-NOM  
'Show me the painter that the soldier is chasing'
3. *ðikse mu ton vasilias pu fotoγrafizi o kloun*  
Show me the-ACC king-ACC that photographs the-NOM clown  
'Show me the king that the clown is photographing'

#### Feminine DPs

4. *ðikse mu tin yineka pu sproxni i mayirisa*  
Show me the-ACC woman that pushes the-NOM cook  
'Show me the woman that the cook is pushing'
5. *ðikse mu tin γata pu kitai i papja*  
Show me the-ACC cat that looks at the-NOM duck  
'Show me the cat that the duck is looking at'
6. *ðikse mu tin tijri pu klotsai i arkuða*  
Show me the-ACC tiger that kicks the-NOM bear  
'Show me the tiger that the bear is kicking'
7. *ðikse mu tin yineka pu pleni i mayirisa*  
Show me the-ACC woman that washes the-NOM cook  
'Show me the woman that the cook is washing'
8. *ðikse mou tin alepu pu ðagoni i papja*  
Show me the-ACC fox that bites the-NOM duck  
'Show me the fox that the duck is biting'

### **Center-Embedded Subject Relative Clauses**

#### Masculine DPs

1. *O jatros pu trava ton aθliti ine psilos*  
The-NOM doctor-NOM that pulls the-ACC athlete-ACC is tall  
'The doctor that is pulling the athlete is tall'
2. *O zoγrafos pu kiniya ton stratioti ine psilos*  
The-NOM painter-NOM that chases the-ACC soldier-ACC is tall  
'The painter that is chasing the soldier is tall'
3. *O vasilias pu fotoγrafizi ton kloun ine psilos*  
The-NOM king-NOM that photographs the-ACC clown is tall  
'The king that is photographing the clown is tall'

#### Feminine DPs

4. *I yineka pu sproxni tin mayirisa ine psili*  
The-NOM woman that pushes the-ACC cook is tall  
'The woman that is pushing the cook is tall'

5. I  $\gamma$ ata pu kitai tin papja ine me $\gamma$ ali  
The-NOM cat that looks at the-ACC duck is big  
'The cat that is looking at the duck is big'
6. I ti $\gamma$ ris pu klotsai tin arku $\delta$ a ine me $\gamma$ ali  
The-NOM tiger that kicks the-ACC bear is big  
'The tiger that is kicking the bear is big'
7. I  $\gamma$ ineka pu pleni tin ma $\gamma$ irisa ine psili  
The-NOM woman that washes the-ACC cook is tall  
'The woman that is washing the cook is tall'
8. I alepu pu  $\delta$ agoni tin papja ine me $\gamma$ ali  
The-NOM fox that bites the-ACC duck is big  
'The fox that is biting the duck is big'

### Center-Embedded Object Relative Clauses

#### Masculine DPs

1. O jatros pu trava o a $\theta$ litis ine psilos  
The-NOM doctor-NOM that pulls the-NOM athlete-NOM is tall  
'The doctor that the athlete is pulling is tall'
2. O zo $\gamma$ rafos pu kini $\gamma$ a o stratiotis ine psilos  
The-NOM painter-NOM that chases the-NOM soldier-NOM is tall  
'The painter that the soldier is chasing is tall'
3. O vasilias pu foto $\gamma$ rafizi o kloun ine psilos  
The-NOM king-NOM that photographs the-NOM clown is tall  
'The king that the clown is photographing is tall'

#### Feminine DPs

4. I  $\gamma$ ineka pu sproxni i ma $\gamma$ irisa ine psili  
The-NOM woman that pushes the-NOM cook is tall  
'The woman that the cook is pushing is tall'
5. I  $\gamma$ ata pu kitai i papja ine me $\gamma$ ali  
The-NOM cat that looks at the-NOM duck is big  
'The cat that the duck is looking at is big'
6. I ti $\gamma$ ris pu klotsai i arku $\delta$ a ine me $\gamma$ ali  
The-NOM tiger that kicks the-NOM bear is big  
'The tiger that the bear is kicking is big'
7. I  $\gamma$ ineka pu pleni i ma $\gamma$ irisa ine psili  
The-NOM woman that washes the-NOM cook is tall  
'The woman that the cook is washing is tall'
8. I alepu pu  $\delta$ agoni i papja ine me $\gamma$ ali  
The-NOM fox that bites the-NOM duck is big  
'The fox that the duck is biting is big'

**Relative Clauses with Quantificational Subject****obj RC\_Q**Masculine Head DP & Masculine Subject Quantifier

1. *ðikse mu ton jatro pu kapjos travai*  
Show me the-ACC doctor-ACC that someone-NOM pulls  
'Show me the doctor that someone is pulling'
2. *ðikse mu ton zoʔrafo pu kapjos kiniya*  
Show me the-ACC painter-ACC that someone-NOM chases  
'Show me the painter that someone is chasing'
3. *ðikse mu ton vasilia pu kapjos fotoʔrafizi*  
Show me the-ACC king-ACC that someone-NOM photographs  
'Show me the king that someone is photographing'

Feminine Head DP & Masculine Subject Quantifier

4. *ðikse mu tin ʔineka pu kapjos sproxni*  
Show me the-ACC woman that someone-NOM pushes  
'Show me the woman that someone is pushing'
5. *ðikse mu tin ʔata pu kapjos kitai*  
Show me the-ACC cat that someone-NOM looks at  
'Show me the cat that someone is looking at'
6. *ðikse mu tin tiʔri pu kapjos klotsai*  
Show me the-ACC tiger that someone-NOM kicks  
'Show me the tiger that someone is kicking'
7. *ðikse mu tin ʔineka pu kapjos pleni*  
Show me the-ACC woman that someone-NOM washes  
'Show me the woman that someone is washing'
8. *ðikse mou tin alepu pu kapjos ðagoni*  
Show me the-ACC fox that someone-NOM bites  
'Show me the fox that someone is biting'

**obj RC\_Q + NP**Masculine Head DP & Masculine Quantificational Subject DP (Restrictor and N)

1. *ðikse mu ton jatro pu kapjos aθlitis travai*  
Show me the-ACC doctor-ACC that some-NOM athlete-NOM pulls  
'Show me the doctor that some athlete is pulling'
2. *ðikse mu ton zoʔrafo pu kapjos stratiotis kiniya*  
Show me the-ACC painter-ACC that some-NOM soldier-NOM chases  
'Show me the painter that some soldier is chasing'
3. *ðikse mu ton vasilia pu kapjos kloun fotoʔrafizi*  
Show me the-ACC king-ACC that some-NOM clown photographs  
'Show me the king that some clown is photographing'



Feminine Head DP & Feminine Quantificational Subject DP (Restrictor and N)

4. *ðikse mu tin γineka pu kapja maγisa sproxni*  
Show me the-ACC woman that some witch pushes  
'Show me the woman that some witch is pushing'
5. *ðikse mu tin γata pu kapja papja kitai*  
Show me the-ACC cat that some duck looks at  
'Show me the cat that some duck is looking at'
6. *ðikse mu tin tiγri pu kapja arkuða klotsai*  
Show me the-ACC tiger that some bear kicks  
'Show me the tiger that some bear is kicking'
7. *ðikse mu tin γineka pu kapja maγirisa pleni*  
Show me the-ACC woman that some cook washes  
'Show me the woman that some cook is washing'
8. *ðikse mou tin alepu pu kapja papja ðagoni*  
Show me the-ACC fox that some duck bites  
'Show me the fox that some duck is biting'

**Free Relatives****subject - FR\_wh/whoever**Masculine *wh*-word & Masculine DP Object

1. *ðikse mu opjon trava ton aθliti*  
Show me whoever-ACC pulls the-ACC athlete-ACC  
'Show me whoever is pulling the athlete'
2. *ðikse mu opjon kiniγa ton stratioti*  
Show me whoever-ACC chases the-ACC soldier-ACC  
'Show me whoever is chasing the soldier'
3. *ðikse mu opjon fotoγrafizi ton kloun*  
Show me whoever-ACC photographs the-ACC clown  
'Show me whoever is photographing the clown'

Masculine *wh*-word & Feminine DP Object

4. *ðikse mu opjon sproxni tin maγirisa*  
Show me whoever-ACC pushes the-ACC cook  
'Show me whoever is pushing the cook'
5. *ðikse mu opjon kitai tin papja*  
Show me whoever-ACC looks at the-ACC duck  
'Show me whoever is looking at the duck'
6. *ðikse mu opjon klotsai tin arkuða*  
Show me whoever-ACC kicks the-ACC bear  
'Show me whoever is kicking the bear'

7. *ðikse mu opjon pleni tin maʝirisa*  
Show me whoever-ACC washes the-ACC cook  
'Show me whoever is washing the cook'
8. *ðikse mu opjon ðagoni tin papja*  
Show me whoever-ACC bites the-ACC duck  
'Show me whoever is biting the duck'

**object – FR\_wh/whoever**

Masculine *wh*-word & Masculine DP Subject

1. *ðikse mu opjon trava o aθlitis*  
Show me whoever-ACC pulls the-NOM athlete-NOM  
'Show me whoever the athlete is pulling'
2. *ðikse mu opjon kiniʝa o stratiotis*  
Show me whoever-ACC chases the-NOM soldier-NOM  
'Show me whoever the soldier is chasing'
3. *ðikse mu opjon fotoʝrafizi o kloun*  
Show me whoever-ACC photographs the-NOM clown  
'Show me whoever the clown is photographing'

Masculine *wh*-word & Feminine DP Subject

4. *ðikse mu opjon sproxni i maʝirisa*  
Show me whoever-ACC pushes the-NOM cook  
'Show me whoever the cook is pushing'
5. *ðikse mu opjon kitai i papja*  
Show me whoever-ACC looks at the-NOM duck  
'Show me whoever the duck is looking at'
6. *ðikse mu opjon klotsai i arkuða*  
Show me whoever-ACC kicks the-NOM bear  
'Show me whoever the bear is kicking'
7. *ðikse mu opjon pleni i maʝirisa*  
Show me whoever-ACC washes the-NOM cook  
'Show me whoever the cook is washing'
8. *ðikse mou opjon ðagoni i papja*  
Show me whoever-ACC bites the-NOM duck  
'Show me whoever the duck is biting'

**subject – FR\_wh/whoever + NP**

Masculine *wh*-phrase (*wh*-word and N) & Masculine DP Object

1. *ðikse mu opjon jatro trava ton aθliti*  
Show me whoever-ACC doctor-ACC pulls the-ACC athlete-ACC  
'Show me whichever doctor is pulling the athlete'

2. *ðikse mu opjon zoγrafo kiniγa ton stratioti*  
Show me whoever-ACC painter-ACC chases the-ACC soldier-ACC  
'Show me whichever painter is chasing the soldier'
3. *ðikse mu opjon vasilia fotoγrafizi ton kloun*  
Show me whoever-ACC king-ACC photographs the-ACC clown  
'Show me whichever king is photographing the clown'

Feminine *wh*-phrase (*wh*-word and N) & Feminine DP Object

4. *ðikse mu opja yineka sproxni tin mayirisa*  
Show me whoever woman pushes the-ACC cook  
'Show me whichever woman is pushing the cook'
5. *ðikse mu opja alepu kitai tin papja*  
Show me whoever fox looks at the-ACC duck  
'Show me whichever fox is looking at the duck'
6. *ðikse mu opja tiγri klotsai tin arkuða*  
Show me whoever tiger kicks the-ACC bear  
'Show me whichever tiger is kicking the bear'
7. *ðikse mu opja yineka pleni tin mayirisa*  
Show me whoever woman washes the-ACC cook  
'Show me whichever woman is washing the cook'
8. *ðikse mu opja alepu ðagoni tin papja*  
Show me whoever fox bites the-ACC duck  
'Show me whichever fox is biting the duck'

**object – FR *wh/whoever* + NP**

Masculine *wh*-phrase (*wh*-word and N) & Masculine DP Subject

1. *ðikse mu opjon jatro trava o aθlitis*  
Show me whoever-ACC doctor-ACC pulls the-NOM athlete-NOM  
'Show me whichever doctor the athlete is pulling'
2. *ðikse mu opjon zoγrafo kiniγa o stratiotis*  
Show me whoever-ACC painter-ACC chases the-NOM soldier-NOM  
'Show me whichever painter the soldier is chasing'
3. *ðikse mu opjon vasilia fotoγrafizi o kloun*  
Show me whoever-ACC king-ACC photographs the-NOM clown  
'Show me whichever king the clown is photographing'

Feminine *wh*-phrase (*wh*-word and N) & Feminine DP Subject

4. *ðikse mu opja yineka sproxni i mayirisa*  
Show me whoever woman pushes the-NOM cook  
'Show me whichever woman the cook is pushing'
5. *ðikse mu opja alepu kitai i papja*  
Show me whoever fox looks at the-NOM duck  
'Show me whichever fox the duck is looking at'

6. *ðikse mu opja tiʔri klotsai i arkuða*  
Show me whoever tiger kicks the-NOM bear  
'Show me whichever tiger the bear is kicking'
7. *ðikse mu opja ʔineka pleni i maʔirisa*  
Show me whoever woman washes the-NOM cook  
'Show me whichever woman the cook is washing'
8. *ðikse mu opja alepu ðagoni i papja*  
Show me whoever fox bites the-NOM duck  
'Show me whichever fox the duck is biting'