Assessing the quantifier scope ambiguity in Greek in the covered box paradigm

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Abstract

Aim of this study is to examine the availability of inverse scope interpretation in doubly-quantified sentences in Greek. A common assumption is that languages with flexible word order lack inverse scope readings due to obligatory movement. However, this assumption is also often contested and shown not to hold. The scope ambiguity with DP-quantifiers has not been thoroughly studied in Greek, and there is no consensus among linguists on whether inverse scope is available or not. The second goal of this study is to investigate how inverse scope availability correlates with the different word orders in Greek, i.e., SVO, VSO and VOS. In order to answer this question, a picture selection task, specifically the covered box paradigm was employed. Our findings showed that Greek speakers generally accept inverse scope, although it is not the most preferred reading. This aligns with the results of recent studies in other languages, implying that inverse scope availability is not determined by a simple distinguishment of the language types, but more by the specific information structure of each sentence.

Keywords: Quantifier Scope; Quantifier Raising; SVO; VSO; VOS; Greek; covered box paradigm

1 Introduction

1.1 The phenomenon

Doubly quantified sentences, i.e., sentences that contain two quantificational phrases (QP), are usually ambiguous. For example, English exhibits scope ambiguities in doubly-quantified sentences like (1), which could mean either that there is only one shark attacking all the swimmers (1a) or that there are several sharks, each of which could attack a different swimmer (1b).

(1) A shark attacked every swimmer.

a. Surface scope

$\exists x.\ shark(x) \wedge \forall y.\ swimmer(y) \rightarrow x\ attack\ y$

There was a single shark that attacked multiple swimmers

b. Inverse scope

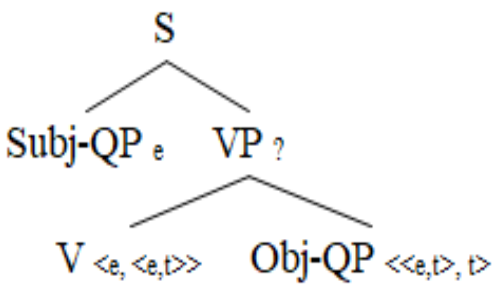
$\forall y.\ [swimmer(y) \rightarrow \exists x\ [shark(x) \wedge x\ attack\ y]]$

For each swimmer, there was a different shark that attacked them

For many years, quantifier scope ambiguities have been at the center of linguistic research. Sentences with double quantification, such as the one in (1), are inherently ambiguous based on both syntactic and semantic analyses. This ambiguity arises from the differences in the relative scope of quantifiers (like "a" and "every") within the sentence's logical form (LF), when they are treated as logical operators.

According to Barwise & Cooper (1981), quantificational determiners (like *a* and *every*) are used to denote the relations between sets of entities. Their denotations are represented as functions which take characteristic functions of the sets as their arguments, and return a truth value, thus they are of type <<e,t>,<<e,t>,t>> (Heim & Kratzer, 1998). Given that the transitive verbs are of type <e, <e,t>>, a type mis-match occurs in sentences like (1) for the object-QP (see Fig. 2).

(2)



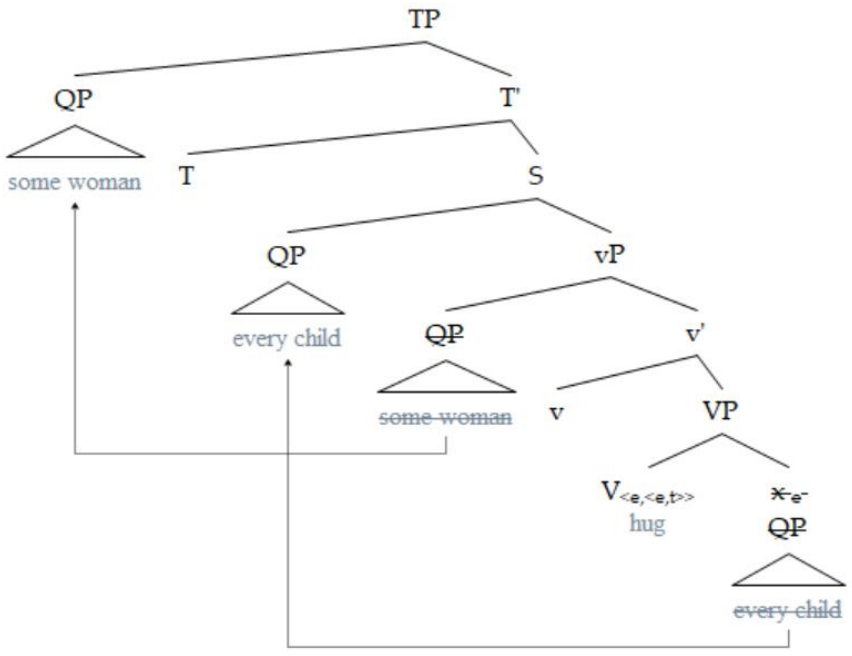
This mismatch can be resolved by a covert movement of the QP to a higher position, which is known as Quantifier Raising (QR). Specifically, the quantificational phrase

moves to the left edge of the sentence, leaving a trace behind. In formal semantics, this trace is interpreted as a variable of a matching type, i.e., x_e, and then, it gets abstracted by inserting a λx right below the moved QP.

May (1977) proposes that the raising of the quantifier to a higher position in the sentence structure results in changes in the scope relationships between quantifiers and other elements in the sentence, and thus, in the arising of the ambiguity. A generalized QP can be raised to adjoin to any sentential node, and which sentential node it adjoins to determines its semantic scope. The ambiguity, thus, arises because we don't know whether the object-QP adjoins over or below the subject-QP. Specifically, if it raises below the subject-QP, we have surface scope interpretation (see Fig. 3)), whereas if it raises over the subject-QP, we have inverse scope interpretation, as shown in Fig. 4.

Moreover, Montague's significant work on semantics (1973) introduces the possibility of scope-shifting, and argues that the scope ambiguity of quantified sentences is a consequence of the complex interplay between the semantics of quantifiers and the overall structure and meaning of the sentence.

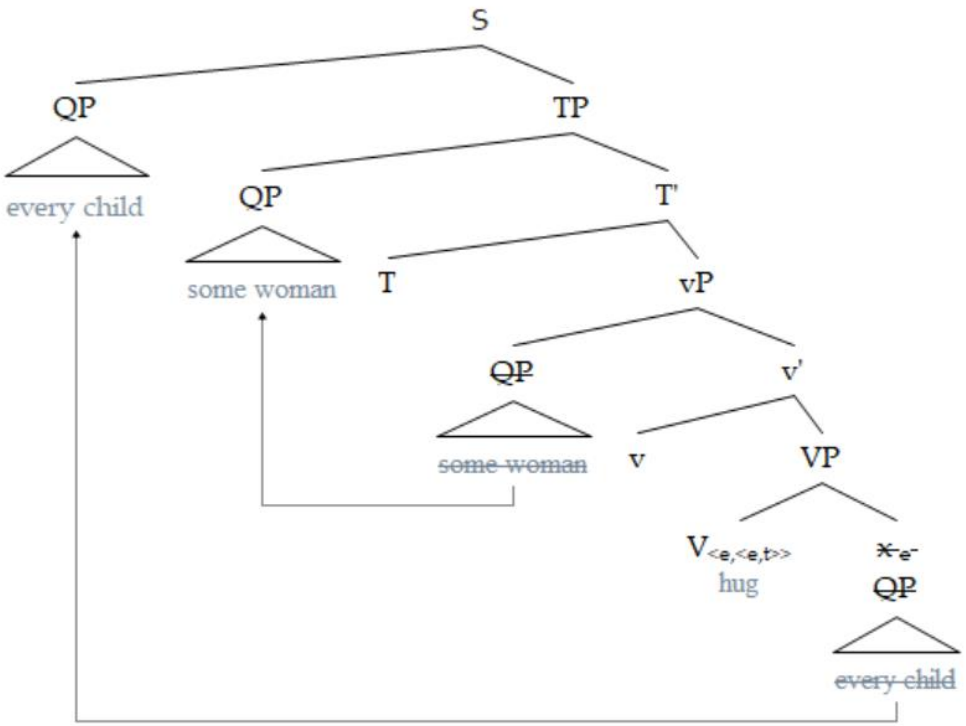
(3) **Surface scope**



∃x. woman(x) ∧ ∀y. child(y) → x hug y

There is a single woman that hugged every children

(4) **Inverse scope**



∀x. [woman(x) → ∃y [child(y) ∧ x hug y]]

For every child, there is a different woman that hugged them.

1.2 Cross-linguistic variation

All the languages do not have the same range of interpretations for the doubly quantified sentences as English. For instance, it has been demonstrated that a number of languages, such as German, Japanese, and Chinese, resist inverse scope readings in constructions similar to (1), and in these languages this kind of structures seem to have a single unambiguous reading (Scontras, et al., 2017).

Specifically, English offers increased flexibility in interpreting quantifier scope, as the derivation of inverse scope interpretation seems to be enabled through movement operations. Furthermore, pragmatic factors and the complex system of quantifier scope interactions have an impact on how accessible the inverse scope readings are. The interaction of syntax, semantics and information structure allows for a wider variety of interpretation options (May, 1977; Brasoveanu & Dotlačil, 2019).

The lack on inverse scope reading has been linked to constraints that prevent the derivation of inverse scope through covert movement of quantifiers. Huang (1982) proposed the Isomorphic Principle as a constraint related to quantifier scope in Chinese. The Isomorphic Principle states that if there are two quantifier phrases A and B, and B is c-commanded by A at the surface structure, then A also c-commands B at Logical Form (LF). This principle aims to maintain a correspondence between the surface structure, and the LF representation of quantifiers in Chinese sentences. This Principle can be violated in English but not in Chinese because of an alternative surface structure (Huang, 1982; Scontras et al., 2017).

Moreover, it has been observed that languages with free word order, e.g., German, often exhibit a high degree of transparency in terms of representing scope relations, while languages with rigid word order, such as English, tend to allow for more scope ambiguity. Bobaljik & Wurmbrand (2012) optimally modeled the crosslinguistic variation, by introducing the term of Scope Transparency (ScoT), according to which, if the order of two elements in Logical Form (LF) is A»B, then it will be the same also in the Phonological Form (PF). ScoT serves as a guiding principle that influences how scope relations are represented in the surface word order of a language. Specifically, in languages with free word order, the surface word order corresponds directly to the LF properties, including scope and information structure, making the scope relations more transparent. On the other hand, in languages with rigid word order the LF properties are not necessarily reflected in the surface word order, and that is why these languages have a higher tolerance for scope ambiguity, and thus, they are flexible in scope interpretation. The compliance to this principle leads to a more transparent mapping between LF nad PF, and contributes to a clearer interpretation of scope relations.

Regarding German, recent experimental studies (e.g., Fanselow, Zimmermann, & Philipp, 2022) have proved that inverse scope reading is acceptable for German sentences with normal S > O word order, in cases where a previous sentence introduces a set of objects, which act as a restriction for the universal distributive quantifier in the following clause.

As far as Greek is concerned, there is still not a consensus on whether the inverse scope is available in sentences like (5), which is similar to (1). Specifically, Kotzoglou (2013) found that there is not inverse scope interpretation in SVO structures, whereas Roussou

& Tsimpli (2006) argue that, although the surface scope reading is the preferred one, the inverse scope is also available. Finally, according to Alexiadou & Anagnostopoulou (1999), the difference in interpretation lies in the word order; the existential subject in SVO structures takes only surface scope interpretation, while in the VSO structures, it can take both scope readings.

(5) Enas karharias epitethike se kathe kolimviti.

A shark attacked to every swimmer

'A shark attacked every swimmer'

a. Surface scope

$\exists x.\ karharias(x) \wedge \forall y.\ kolimvitis(y) \rightarrow x$ epitethike y

There was a single shark that attacked multiple swimmers

b. Inverse scope

$\forall y.\ [kolimvitis\ (y) \rightarrow \exists x\ [karharias\ (x) \wedge x$ epitethike $y]]$

For each swimmer, there was a different shark that attacked him

Experimental work on the scope ambiguity in Greek is limited. Baltazani (2002) was the first to examine the topic, and specifically the interaction of scope readings and prosody. Furthermore, Oikonomou et al. (2020), focused on how the different word orders affect the availability of inverse scope. Further work is needed in order to figure out under which conditions inverse scope becomes accessible, and more experimental data can contribute towards a better understanding of the syntax and semantics of these structures in Greek.

1.3 The current study

With regard to what mentioned in the previous sections, the overarching goal of the present study is to contribute to a large body of literature that aims to clarify the distribution of the inverse scope readings cross-linguistically and, in doing so, to investigate under which conditions inverse scope interpretation is available in different languages. Specifically, this study focuses on the availability of inverse scope reading

in Greek by examining different word order patterns, namely the default SVO and VSO, which are the unmarked ones, as well as the less common VOS. Our aim is to improve understanding of the distribution of inverse scope interpretations in doubly quantified sentences in the three examined word orders.

That said, the main research questions of the current study are:

RQ1: Is inverse scope interpretation available in doubly quantified sentences in Greek?

RQ2: Does the word-order affect this availability in those sentences?

To what follows, Section 2 introduces more detailed information about the phenomenon of scope ambiguity in Greek, as well as the ways that the different word orders affect the interpretation of the quantifier scope. Section 3 explains in detail the methodology used for the experiment, while Section 4 presents the analysis model and the results. Finally, Section 5 provides a broad discussion of the findings and wraps up the key ideas.

2 Scope ambiguities in Greek

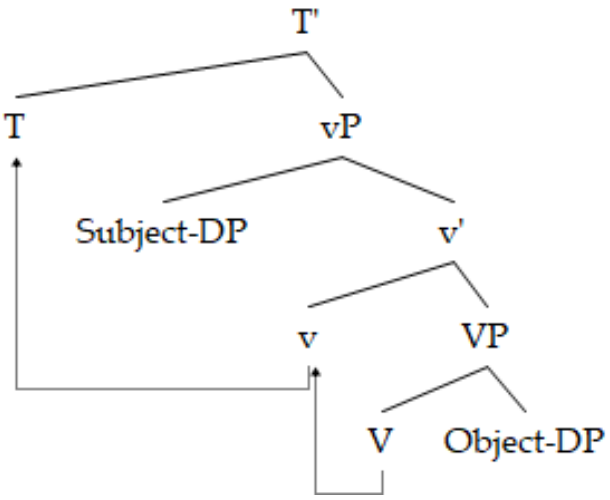
Greek language demonstrates flexibility in word order, allowing for different arrangements based on the context, and this variability has long been observed to be linked to variations in information structure (Alexiadou & Anagnostopoulou, 1998; Spyropoulos, 1999; Kotzoglou, 2013). In this chapter, I will try to explain how scope ambiguity occurs in Greek in the three examined word orders, i.e., VSO, SVO, and VOS. On this purpose, I will start by presenting the properties of these word orders, and then, I will discuss previous work on the topic.

2.1 The default VSO word order

VSO and SVO are considered to be the "default" word orders in Greek, as they can serve as a response to an all-new information seeking question, without requiring any prior context (Philippaki-Warburton, 1985; Tsimpli, 1990). According to Alexiadou & Anagnostopoulou (1998), VSO, which is considered to be the basic word order in

Greek, is derived by moving the verb to Tense, leaving trace of type-e arguments back, as can be seen in Fig. 6.

(6)



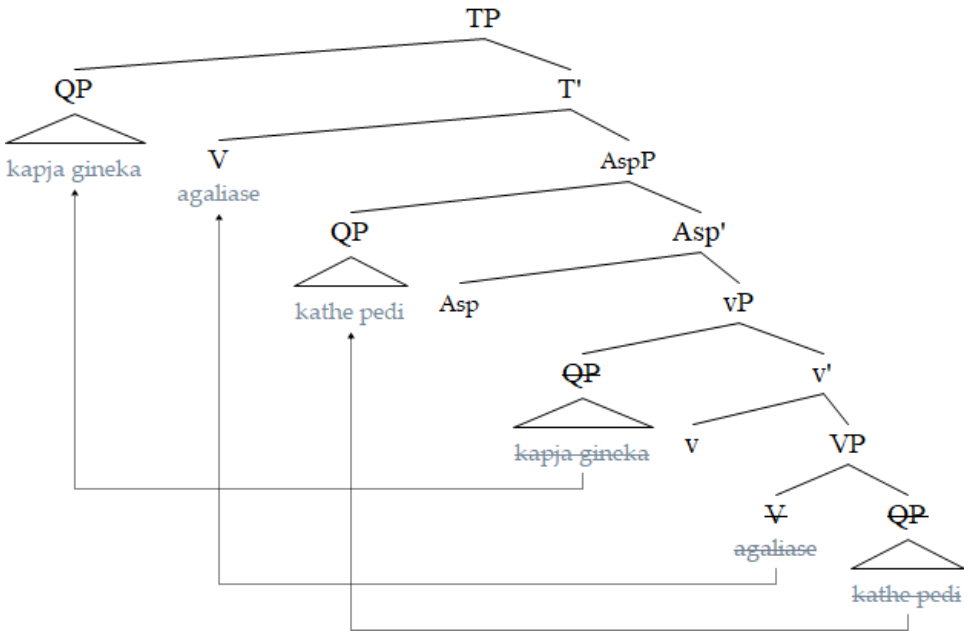
Based on what was already said in the Introduction about the type mismatch, the quantifier of type <<e,t>,t> needs to raise to resolve the type mismatch. However, at this point there is a question about which element moves first -the object-QP or the subject-QP-, as the timing of these operations will determine the scope interpretation.

Let's assume that we have standard bottom-up derivation, and that we also adhere to the Strict Cycle condition, introduced by Chomsky (1993). According to this condition, movement occurs first in the lower nodes of the tree, thus these nodes move before the higher ones. Moreover, we propose that QR respects the constraints of locality (Cechetto, 2004), which means that the object-QP relocates to the edge of AspP, where this QP can be interpreted.

(7) Agaliase kapja gineka kathe pedi.
Hugged a woman every child
'A woman hugged every child'

Based on these assumptions, a sentence like (7) can have a surface scope reading derived by the LF in Fig. 8, in which the object-QP relocates first and the subject-QP follows to a higher node. On the other hand, for the inverse scope interpretation of (7), an additional movement is required for the object-QP to raise higher than the subject, as presented in Fig. 9, where the additional movement is indicated with the red arrow. It needs to be mentioned that, while the verb overtly moves to T, the QPs raise only in LF.

(8)



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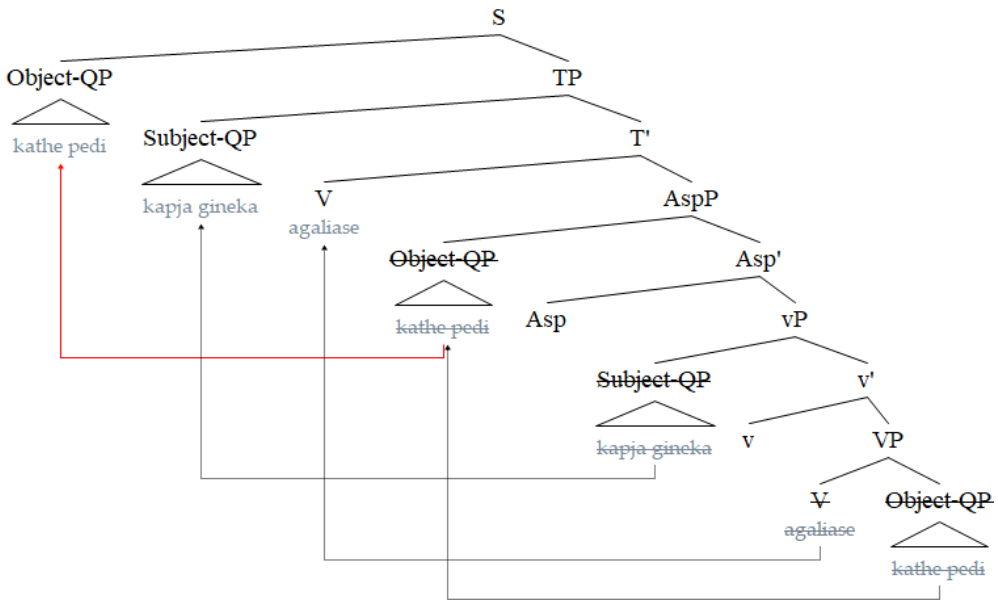


According to this view, it is expected that for Greek VSO sentences, the surface scope will be more accessible than the inverse scope reading, as the latter one requires an extra step movement.

2.2 The default SVO word order

First of all, it is important to highlight that when referring to the default SVO word order (10a), we distinguish it from the marked SVO order, where the subject is the focus, and this is indicated by the characteristic intonation (see 10b, where the focus on subject is indicated by capital letters). The default SVO can be the answer to "what-happened" questions, without any previous context, and it often denotes broad focus, indicated by nuclear pitch accent on the last stressed syllable (Oikonomou et al., 2020). Although the SVO worder order in Greek seems to be more preferable when the sentence involves a transitive predicate, in sentences with one argument, the VS order is more frequent than the SV (Lascaratou, 1989).

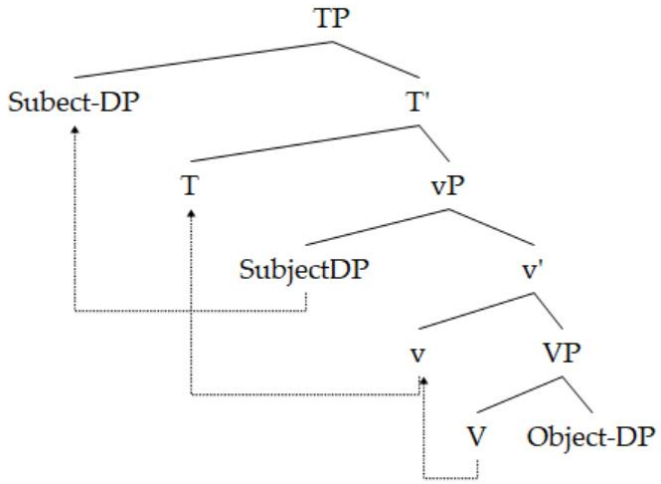
(10) a. I Maria plirose ton logariasmo
the Maria-NOM paid the bill-ACC
'Maria paid the bill'

b. I MARIA plirose ton logariasmo, ohi i Vasso
the MARIA-NOM paid the bill-ACC, not the Vasso-NOM
'Maria paid the bill, not Vasso'

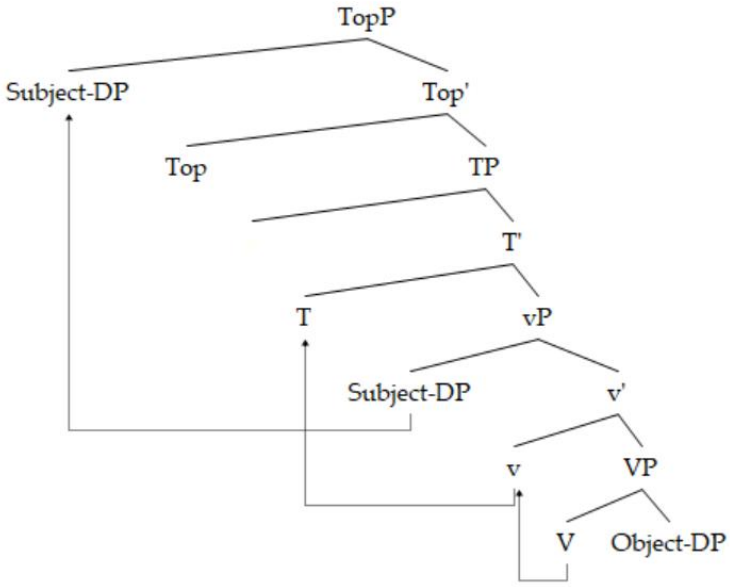
The unmarked SVO word order can be quite confusing, as there are two possible explanations for its LF. On the one hand, a possible LF would be the same as in English (see Fig. 11), according to which the subject is base-generated in SpecvP, and then moves to SpecTP (A-movement). However, there are strong arguments against the existence of the EPP-feature in Greek which would result in an A-movement, like in English. Specifically, Alexiadou & Anagnostopoulou (1998) mention that "the SVO structures do not involve Spec-head relation between the subject and the verb", but this

structure can be explained as an A' movement (topic movement) at the SpecTopP, as presented in Fig. 12.

(11)



(12)



According to all the above, some argue that an A-movement is more appropriate in this case (Roussou & Tsimpli, 2006; Spyropoulos & Revithiadou, 2009), while others analyze SVO structures as a CLLD (Philippaki-Warburton, 1985; Tsimpli, 1990; Alexiadou & Anagnostopoulou, 1998; Kotzoglou, 2013). Depending on the analysis that we will consider, we will have two different predictions about the quantifier scope; if we consider the movement analysis, we expect that inverse scope would be available by raising the Object-QP above the moved subject, like in Fig. 9. However, if we

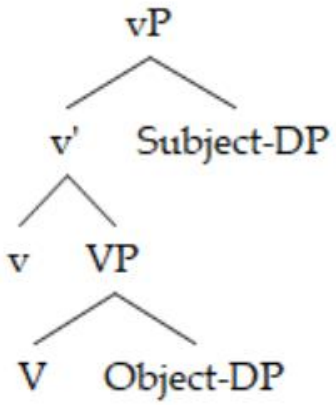
consider the second analysis, about the subject being CLLD-ed, we would expect surface scope only, as the inverse scope could not become accessible (Alexiadou & Anagnostopoulou, 1998). In the same paper, it is further mentioned that, although the scope properties of a QP are preserved when it moves from its first position to an A-position, the Greek preverbal subject does not behave like this. Instead, in Greek, the scope properties of a quantifier are not preserved in a preverbal position (i.e., SVO), and thus, the preverbal existential Subject-QP takes only surface scope over the universal Object-QP, whereas in a postverbal position (i.e., VSO) both the surface and the inverse scope can be available, as discussed in the previous section (Section 2.1).

2.3. The VOS word order

First of all, it should be noted from the beginning that we will only focus on VOS under neutral intonation, which means that the primary clausal stress is assigned to the subject. Regarding the LF of the VOS structure, there have several analyses been put forward over the last decades.

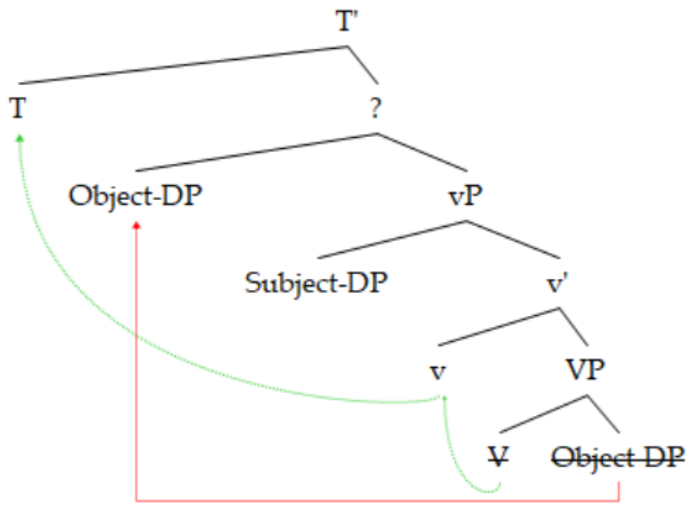
One possible analysis is that the VOS order is the result of the subject right-adjoining in a high position in the tree. According to Tsimpli (1990), the difference between SVO and VOS is that in the former case the subject is left-adjoined to vP, while in the latter case it is right-adjoined to vP (Fig.13).

(13)



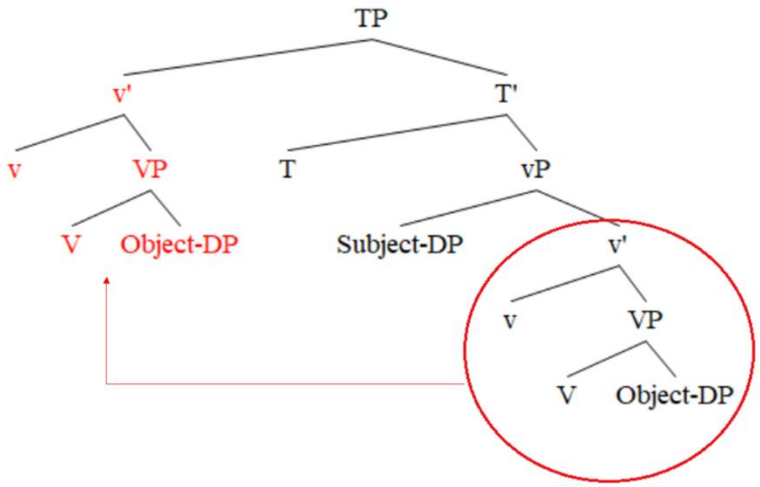
On the other hand, according to Kechagias (2008), the VOS structure is the result of the object moving alongside the verbal head. Under this observation, a second possibility would be an 'object-scrambling' analysis, which means that the object undergoes local movement from an underlying VSO order (Fig. 14). After this movement, the object ends up higher than the in-situ subject and lower than the verb, which has been already raised to T (Alexiadou, 1999; Haidou, 2000).

(14)



Finally, a third possibility is that it is not the object alone that moves to a position higher than the subject, but something larger. Specifically, Kechagias (2008) argues that in VOS structures, the V-to-T movement involves not only the verb but a larger constituent, namely the whole v' node, which contains the verbal head and the object-DP (Fig. 15), and that is what distinguishes VOS from SVO structures. This type of analysis can be found in Philippaki-Warburton (2001) and Georgiafentis (2001), as well.

(15)



Regarding the scope reading of VOS structures, both surface and inverse scope are available, but the former (i.e., surface) appears to be the most preferred one. Specifically, in VOS structures, the scope is determined after the moved v'-node has reconstructed to its based position (Kechagias, 2015). Under the assumption that the object moves first to an interpretable intermediate position, the inverse scope reading can be derived by reconstructing the object to this position, which falls within the raised universal quantifier's scope.

2.4. Previous studies on the topic

As mentioned in the beginning of this paper, there is not extent experimental work on this topic in Greek. The first person who experimentally tested scope ambiguities in Greek was Batazani (2002). Her work focuses on the effect of prosody on scope preferences, and offers a strong foundation for future research, as she gave a thorough explanation of Greek prosodic patterns and the prosody of doubly quantified sentences. For doubly quantified sentences, Baltazani (2002) found no interaction between prosody and word order. Rather, she discovered an interaction between surface scope and subjecthood. However, it is difficult to draw firmer conclusions about each quantifier, since Baltazani tested a large number of quantifiers in a variety of word orders.

Chatzikonstantinou et al. (2012) have also investigated the prosodic effect and the interaction of negation with negative polarity items (NPIs) and the universal quantifier. They found that prosody indeed interacts with NPIs, but not with the universal quantifiers. Finally, the availability of inverse scope has also been examined by Katsimpokis (2015), who suggested that inverse scope is available in Greek, but not the preferred interpretation.

Finally, Oikonomou et al. (2020), employed a truth value judgement task with pictures, in order to examine the scope interpretation in four word-orders: the default VSO and SVO, and the marked SVO and OVS. According to the experimental results of this study, inverse scope is generally available to Greek speakers in all the examined word orders, except in environments with Clitic Left Dislocation (CLLD), where participants rejected the inverse scope reading 90% of the times. This implies that the default SVO and the CLLD-ed SVO cannot be equally analyzed, as Alexiadou & Anagnostopoulou (1998) also argue. The results showed the difficulty of scope interpretations in doubly quantified sentences, and confirmed the theory that the derivation of inverse scope is possible in Greek, if not excluded by grammatical constraints.

In the current study, we will focus on the existential quantifier *kapjos* ('some') and the universal quantifier *kathe* ('every') in the unmarked VSO and SVO structures, as well as in the marked VOS structure. The following chapter presents the Experiment in detail.

3 Methods

3.1 Participants

For the current study, thirty-five (n=35) adults were tested. Twenty (n=20) of them were female, and fifteen (n=15) were male. Twenty-nine (=29) participants belong in the age group 18-30, whereas six (n=6) in the age group 31-45. There were three excluding criteria for the study; being non-native speaker of Greek, being bilingual, and being dyslexic. All participants stated that they are native speakers of Greek, grown monolingually, and that they have not been diagnosed with dyslexia, so no one was excluded from the study. In order to ensure the anonymity of the study, participants

were not asked their names or any contact detail either. The participants were recruited via my personal social network, and they did not receive any reimbursement for their participation, but they participated voluntarily. Participants were randomly divided into three groups, two of twelve (n=12) subjects, and one of eleven (n=11) subjects. Each group saw a different version of the experiment, as it is explained in the following sections.

3.2 Materials and Design

In order to examine the availability of inverse scope reading in doubly quantified sentences, a picture selection task in the covered box paradigm (Huang et al. 2013) was employed. Participants were shown a sentence, followed by three pictures, one of which was covered. One of the uncovered pictures was representing the inverse scope reading of the sentence for the SVO and VSO structures and the surface scope for the VOS structure. The other uncovered picture was completely irrelevant to the meaning of the sentence, and it was used as a distractor, so as to ensure that participants pay attention, and not answer randomly. The covered picture was actually used to represent the surface scope reading of each sentence for the SVO and VSO structures, and the inverse scope for the VOS.

Something significant that need to be mentioned is that a particular issue was subjected to discussion, regarding the VOS sentences. In this type of structures, the Object-QP takes scope over the Subject-QP in the surface, thus their surface scope reading matches the inverse scope reading of the VSO and SVO structures. When designing the experiment, we had to decide whether we would use the same 'target' picture for all the versions of an item, although it would represent a different scope for the VOS order (i.e., the surface scope, while for the VSO and SVO the same picture would represent the inverse scope). The other option would be to design a new picture for each VOS item, which means that the participants would have seen a different version of some items, resulting in a more complicated analysis of the data. We finally decided to use the same 'target' picture for every word order of each item, and take into account in our analysis that for the VOS condition the 'target' answers would match the surface scope.

The covered-box paradigm has previously been employed in studies regarding presuppositions (Chen, 2022; Feng, 2022), the meaning of number words (Huang,

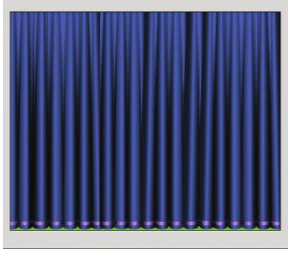
2013), as well as quantifier scope in German (Fanselow, Zimmermann & Philipp, 2022). The rationale of the covered-box paradigm lied on the fact that the surface scope reading is the mostly preferred one, as mentioned before, while the availability of the inverse scope reading is under question. The inverse scope interpretation was explicitly displayed through the visible picture, and participants should consider whether this picture corresponded to the meaning of the stimulus. A rejection of the visible statement (i.e., choosing the covered one) indicated that the uncovered scope interpretation was not available to the participants. On the other hand, in a traditional picture-selection task, if the inverse and the surface scope readings were shown to participants at the same time, presumably the participants would mostly have favored the surface scope reading, which would be more straight-forward to them. Therefore, it would be difficult to examine the likelihood of inverse scope reading through this method.

The target stimuli consisted of doubly quantified sentences, with the existential quantifier being the subject-QP, and the universal quantifier being the object-QP (see 16). When the universal quantifier takes higher scope than the existential one on surface, the inverse scope entails the surface scope. Because of this, we cannot single out a case in which inverse scope would hold but the surface scope would not be true. Thus, asking people about the acceptance of a situation for such sentences does not provide means to establish the existence of the inverse scope independently of the surface scope. (Reinhart, 2006). Therefore, we created test items with the existential quantifier taking higher scope than the universal in the surface scope reading, so the availability of the inverse scope reading would imply that the universal quantifier should be covertly raised above the existential one.

(16) *Kapja mitera taise kathe moro*
'Some mother fed every baby'

(a) Distractor image

(b) Target image



(c) Covered image

The word order was the only manipulated variable. which had three levels representing the three examined word-orders: SVO, VSO and VOS. Fifteen (n=15) test sentences were created, each of which were presented in the three word-orders, producing forty-five (n=45) test items in total. The 45 test items were divided into three sets of 15 (groups A, B & C), and they were counterbalanced across the three groups, so as each participant saw only one version of each item, resulting in a Latin-square design. An example of the three versions of a testing item can be seen in table 17. Specifically, (17a) presents the SVO order, (17b) presents the VSO order, and (17c) presents the VOS order. The testing item showed in (17) is the same one as in (16).

(17) (a) *Kapja mitera taise kathe moro*
some mother-NOM fed-3SG every child-ACC
(b) *Taise kapja mitera kathe moro*
fed-3SG some mother-NOM every child-ACC
(c) *Taise kathe moro kapja mitera*
fed-3SG every child-ACC some mother-NOM
'Some mother fed every baby'

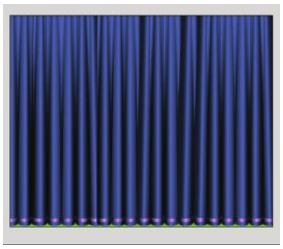
Moreover, fifteen (n=15) filler items, which included single-quantified sentences, and thus, they were definitely unambiguous, were added to each set. The same filler items were used for every set. For eight (n=8) of these sentences, the quantified sentence was compatible with one of the uncovered pictures (see 18i), while for the other seven (n=7) sentences, the quantified sentence was incompatible with any of the uncovered pictures, thus the correct answer was the covered picture (see 18ii).

(18)

i. *Kapjos ipurgos episkefthike to arheo mnimio*
'Some minister visited the ancient monument'

(a) Distractor image

(b) Target image

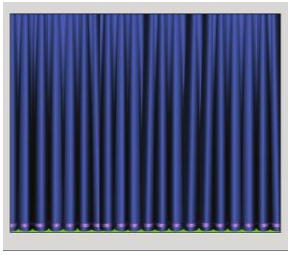


(c) Covered image

ii. *To vivlio sto trapezi den ine megalo*
'The book on the table is not big'

(a) Distractor image

(b) Target image



(c) Covered image

These filler items were used to detect a response bias, and also to test whether participants could answer correctly. Test items and filler items were arranged in a random order. All the stimuli and the pictures used in the selection task can be found in the Appendix.

The experiment was built in PennController for Internet Based Experiments (PCIbex, for short), and displayed in PCIbex Farm. The pictures used for the experiment were particularly designed for the purposes of the study in Photoshop (Beta)- Adobe Community.

3.3 Procedure

The experiment was held in person. All the participants used the same laptop to do the selection task. They were seated in a quiet room, and they had the option to choose either the mouse or the mousepad, depending on what they feel more comfortable with.

At the beginning, the participants read the information letter, which explained the aim and the procedures of the experiment, as well as the data management information. Participants got informed about data protection issues and their rights, complying with standard ethics requirements on linguistic experiments. They had the right to quit the experiment at any time. The information letter was implemented in the coding of the software used to present the stimuli and the pictures; the experiment only started running after participants stated that they have read and understood the aforementioned information, and that they participate voluntarily.

Moreover, they filled-in a form with their demographic data, i.e., age group, whether they are monolinguals native speakers of Greek, and whether they have been diagnosed with dyslexia.

The study was comprised of two parts; the familiarization phase and the testing phase. During the familiarization phase, the participants were introduced to the covered-box task via three practice trials. For two of the trials, the correct picture was the covered one, whereas for the remaining one, the correct answer was the uncovered picture.

For the testing phase, each participant was shown a total of thirty (n=30) sentences, fifteen test items and fifteen fillers. Each sentence was followed by the three pictures. Participants were asked to choose the picture that they considered true, regarding the meaning of the sentence. Since one of the three pictures was covered up, participants only opted for the covered option if they were certain that the uncovered pictures were false. Participants were not given feedback after each choice and were not allowed to uncover the covered box.

This study was approved by the Faculty Ethics Assessment Committee – Humanities of Utrecht University (reference number 23-149-04).

3.4 Data processing

R-version 4.3.2 (R Core Team, 2023) was used for cleaning and processing the data. The first step was to create a new data frame with more user-friendly names for the stored data (e.g., change the column labels, replace the participants' random id, etc.). and then, to check that all the responses have been correctly recorded for all the participants. The next step was to remove all the unnecessary data, namely all the empty columns or the columns with information that we did not take into account in the analysis, e.g., response time.

After that, the cleaned data were checked per subject to identify whether a participant had a lot of mistakes. The criterion for this was the amount of 'distractors' that each participant had chosen. If a participant had chosen more than seven (n=7) 'distractors' in their answers out of thirty (n=30) items, they would be excluded. However, no participants were excluded from the main analyses based on that criterion, as the average amount of 'distractors' was 3. Table 19 provides a summary of how often distractors were chosen in total, in each experimental condition, and in fillers.

Table 19: Number of distractors per condition

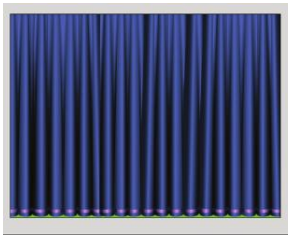
	Total	**SVO**	**VSO**	**VOS**	**Fillers**
Total answers	1050	175	175	175	525
Number of 'distractors'	90	8	8	10	64

The next step was to check the data per item in order to identify whether a specific item, either test item or filler, gathered relatively high amount of 'distractor' answers. For one experimental item, namely the sentence '*Some doctor examined every participant*', almost half of the answers were the 'distractor' in all the three word-orders (SVO, VSO, VOS). This probably happened because the target picture (20b), which was supposed to represent the inverse scope reading, was confusing. We, thus, decided to exclude this item, and not take it into account for the analysis.

(20) *Kapjos jiatros eksetase kathe astheni*
'Some doctor examined every patient'

(a) Distractor image

(b) Target image



(c) Covered image

The analysis of the data, as well as the results are being presented in detail in the following chapter.

4 Predictions, Results and Discussion

4.1 Predictions

In general, based on the existent literature, we expect that both surface and inverse scope readings are available in Greek, with the surface scope being the most preferred option.

Specifically, regarding the VSO word order, according to the analysis of these structures that was discussed in Chapter 2.1, inverse scope is supposed to be less accessible than the surface scope, as it requires an additional movement step, in order to be interpreted (see Fig. 9).

As far as the SVO order is concerned, our expectations differ based on which analysis of the structure we consider. If we assume that in SVO the subject is base generated in SpecvP and then, it moves to SpecT, the LF would be similar to the VSO structure. Thus, we would expect both scope readings to be available, with the inverse being less preferred due to the additional movement of the Object-QP.

On the other hand, if we consider the CLLD-ed subject analysis (Alexiadou & Anagnostopoulou, 1998), according to which the subject moves to SpecTopP, then the

surface scope is the only accessible option to the speakers, and SVO structures have no inverse scope interpretation.

Finally, regarding the VOS structures, the question is whether the Object-QP takes scope over the Subject-QP, or vice versa. According to the analysis of Kechagias (2008), discussed in Chapter 2.3, we expect that the VOS structures will also have ambiguous scope interpretation, with both scopes being available, but the surface scope being again the most preferred option.

4.2 Results

4.2.1 Data exploration

For the data exploration, we used R-version 4.3.2 (R Core Team, 2023). We first checked the data per condition to get a picture of the responses' distribution. The results are presented in the following table.

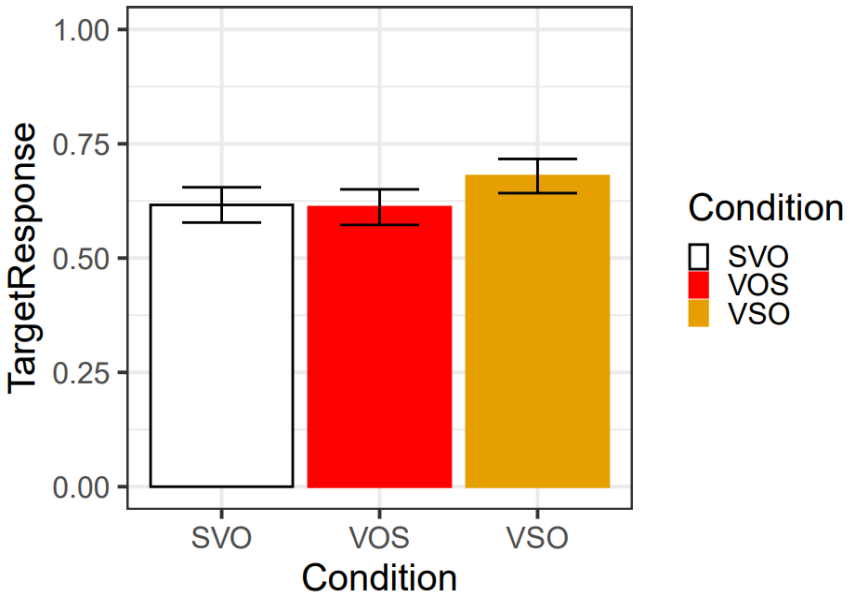
Table 21: Answers per condition

Word Order	distractor	target	covered
SVO	5	98	61
VOS	6	96	61
VSO	7	106	50

First of all, we observe that in SVO order, participants mostly chose the target picture, namely the inverse scope interpretation of the sentences. However, as we will see in Section 4.2.2, the difference between target and covered picture, i.e., inverse and surface scope accordingly, turned out to be non-significant, indicating that surface scope reading is also available in SVO structures, as expected. A similar pattern is observed in VOS structures, as well. As can be seen in Table 21, the SVO and VOS structures present almost same results. On the other hand, the results for the VSO structure showed that participants opted for the inverse scope almost twice as much as for the surface scope, as the target picture collected 106 answers whereas the covered one only 50 answers.

The results are visually presented in the following graph. Specifically, Figure 22 illustrates the percentages of 'target' responses across the three conditions, indicating the frequency with which participants selected the 'target' picture, i.e., the inverse scope reading of the SVO and VSO sentences, and the surface scope reading of the VOS sentences. The graph reveals that these percentages are relatively consistent across all three conditions, with a slight increase observed in the VSO condition. This aligns with our prior observations that participants more frequently opted for the inverse scope reading in the VSO condition.

Figure 22: 'Target' answers per condition



The next step of the analysis was to check the answers both per word order and per picture order to investigate if the order in which the pictures were presented to the participants affected their responses. According to Table 23, the picture order didn't seem to play any important role to participants' answers. Participants tended to choose the 'target' picture with the same frequency, regardless the presentation order, and this pattern was also observed for the 'covered' responses.

Table 23: Answers per Picture Order

PictureOrder	distractor	target	covered
covered; distractor; target	1	49	28
covered; target; distractor	7	48	25
distractor; covered; target	4	47	27
distractor; target; covered	3	47	32
target; covered; distractor	2	54	33
target; distractor; covered	1	55	27

Tables 24 and 25 present the distribution of participant choices across conditions for the first and second half of the experiment, respectively. In Table 24 (first half of the experiment), participants tended to select the covered picture less frequently. This pattern appears to reverse in Table 25 (second half of the experiment), where selections of the covered picture increased. This trend might indicate that during the initial stages of the experiment, participants engaged in more attentive examination of the uncovered pictures. However, as the experiment progressed, potential factors like boredom or fatigue could have led to a shift in selection strategy.

Table 24: Distribution of the answers across conditions in the first half of the experiment

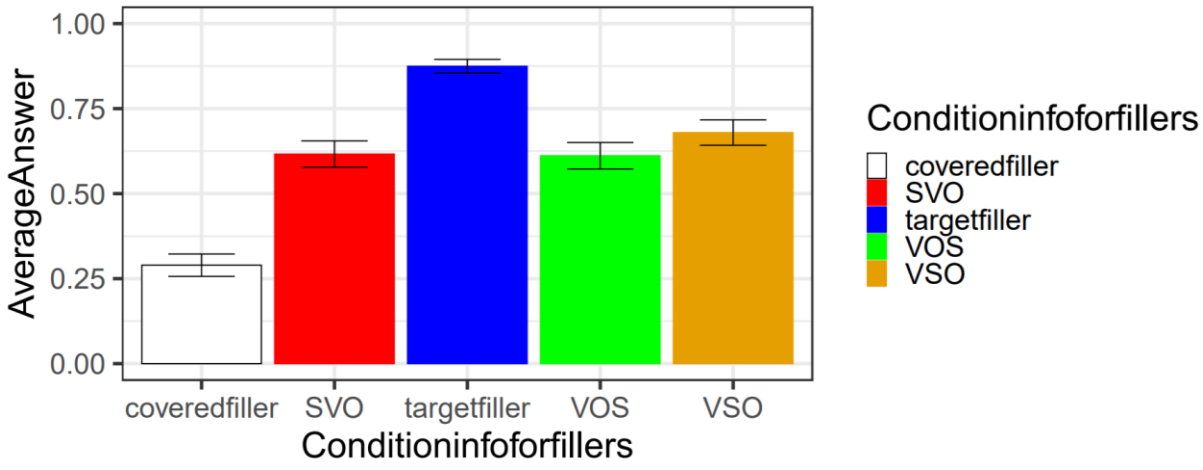
Word Order	distractor	target	covered
SVO	3	39	25
VOS	3	41	23
VSO	3	50	19

Table 25: Distribution of the answers across conditions in the second half of the experiment

Word Order	distractor	target	covered
SVO	2	59	36
VOS	3	55	38
VSO	4	56	31

Furthermore, we extended the analysis to the entire dataset, including the filler sentences, in order to make sure that participants had understood the task and done it properly. Specifically, we examined the percentages of "target" responses across the five experimental conditions; the three testing word orders (*SVO, VSO, VOS*) and the two levels of fillers, i.e., those related to the target picture (*targetfiller*) and those matching with the covered picture (*coveredfiller*). For the SVO and VSO word orders, the 'target' response was compatible with the inverse scope reading of the sentences, while for the VOS the 'target' response was compatible with the surface scope. For the *targetfillers*, the 'target' response matched the meaning of the sentences, whereas for the *coveredfillers,* the 'target' response was the wrong answer, as the sentences were supposed to match the covered picture. The following graph (Fig. 26) presents the distribution of "target" responses across these five conditions.

Figure 26: Distribution of 'target' answers across five conditions (incl. fillers)



The percentage of "target" responses for *targetfiller* reached nearly 90%, as expected, since the meaning of the sentences was supposed to match the target picture. The proportion of "target" responses for *coveredfiller* was slightly above 25%, as this type of fillers were supposed to not match any uncovered picture, thus they matched the covered one. Finally, the distribution of "target" responses across the three word orders is the same as the one described in Figure 22.

4.2.2 Statistical analysis

The data were analyzed with Linear Mixed-Effects logistic regression models with the use of *lme4*- version 1.1-30 (Bates, Mächler, Bolker, & Walker, 2015), and *lmerTest* packages- version 3.1-3 (Kuznetsova, Brockhoff, & Christensen, 2017).

The dependent variable in our models was the scope interpretation of the doubly-quantified sentences, i.e., surface and inverse scope. Specifically, we included the 'target' answers, which indicated the inverse scope reading for the SVO and the VSO, and the surface scope for the VOS. The independent variables were the word-order (*WordOrder*), the order in which the pictures appeared to the participants (*PictureOrder*), and the part of the experiment in which each item was presented (*ExpHalf*). As random effects, we included random intercepts for subjects (*Subj*) and items (*Item*).

(27) `Target ~ 1 + WordOrder + (1|Subj) + (1|Item)`

Our first model (Formula 27) evaluated the effect of the word order ('*SVO*', '*VSO*', '*VOS*'; the former being the reference level) on the '*target*' answers. The results (Table 28) indicated that the 'SVO' condition (*Intercept*) increases the likelihood of inverse scope: $\beta = 0.78$, $p = 0.07$; however, this effect is not statistically significant. Similarly, the 'VSO' condition also shows an increase in this probability ($\beta = 0.26$, $p = 0.38$), but this effect is not statistically significant either. Conversely, the 'VOS' condition decreases the probability of surface scope ($\beta = -0.13$, $p = 0.65$), yet this result also lacks statistical significance. Moreover, the analysis of random effects revealed significant random intercept variance for both subjects and items (*variance* = 2.93 and *variance* = 0.84, respectively). In summary, the model indicates some random variability by subject and item, but no statistically significant fixed effects for the condition.

Table 28: Probability of 'target' answer in each condition

Condition	***β***	***p*-value**
SVO (*Intercept*)	0.78	0.07
VSO	0.26	0.38
VOS	-0.13	0.65

We further studied the interaction of the word order and the picture order, by considering the model in Formula 29. However, none of the fixed effects are statistically significant ($p > 0.05$), suggesting that there are no significant differences in the average answers across the three different conditions or their interaction with the picture order, as can be seen in Table 30. Thus, there is no evidence that the order in which the pictures were presented to the participants played a role in their responses.

(29) `Target ~ 1 + WordOrder * PictureOrder + (1|Subj) + (1|Item)`

Table 30: The probability of 'target' answer in each condition and in every picture order

Condition	***β***	***p*-value**
VSO – covered; distractor; target (*Intercept*)	0.95	0.15
VSO – covered; target; distractor	0.38	0.64
VSO – distractor; covered; target	0.09	0.90
VSO – distractor; target; covered	0.21	0.80
VSO – target; covered; distractor	-0.09	0.90
VSO – target; distractor; covered	0.13	0.86
SVO – covered; distractor; target	-0.67	0.40
SVO – covered; target; distractor	-0.02	0.99
SVO – distractor; covered; target	0.68	0.53
SVO – distractor; target; covered	-0.13	0.21
SVO – target; covered; distractor	1.16	0.28
SVO – target; distractor; covered	0.47	0.67
VOS – covered; distractor; target	-0.46	0.52
VOS – covered; target; distractor	0.61	0.58
VOS – distractor; covered; target	0.29	0.79
VOS – distractor; target; covered	-0.33	0.75
VOS – target; covered; distractor	0.16	0.88
VOS – target; distractor; covered	-0.17	0.87

Furthermore, the model in Formula 31 aimed to examine the effects of the interaction between the *WordOrder* and the part of the experiment (*ExpHalf*) that the items were presented on the participants' responses.

(31) `Target ~ 1 + ExpHalf * WordOrder + (1|Subj) + (1|Item)`

As we can see in the following Table 32, the VSO order in the first half of the experiment increases the probability for the target picture, and thus, for the inverse scope ($\beta = 1.35$, $p = 0.01$). Taking this as the reference level, we observe that SVO and VOS in the first half of the experiment decreased the probability of the 'target' picture ($\beta = -0.53$, $p = 0.26$ and $\beta = -0.58$, $p = 0.20$, accordingly). Regarding the second half of the experiment, we interestingly observe that the probability for inverse scope decreases, as we have a negative coefficient ($\beta = -0.58$, $p = 0.18$), but this might be due to randomization of the items' presentation. For this part of the experiment, the SVO and VOS did not show any significant result even though numerically, they increased the probabilities for the 'target' response. Overall, we can conclude that the effect of the interaction between the experimental part and the word order was statistically insignificant.

Table 32: The probability of 'target' answer in each condition and in each half of the experiment

Condition	***β***	***p*-value**
First half- VSO	1.35	0.01
First half- SVO	-0.53	0.26
First half- VOS	-0.58	0.20
Second half- VSO	-0.58	0.18
Second half- SVO	0.51	0.41
Second half- VOS	0.36	0.56

The last model that we considered was the same as in Formula 27, but this time the dataset included the two types of fillers; the *target fillers,* whose meaning corresponded

to the target picture, and the *covered fillers*, whose meaning was incompatible with both uncovered pictures and thus corresponded to the 'covered'. We included the fillers, in order to make sure that the participants indeed comprehended the task, and paid attention when participating.

The results, as shown in Table 33, confirmed that the target-fillers significantly increased the probability of selecting the target picture (β = -1.24, p = 0.001), while covered fillers significantly decreased this probability (β = -1.24, p = 0.001). Although this model proved that participants understood the task, it failed to provide evidence for the effect of word order on the inverse scope interpretation, as the results were not statistically significant.

Table 33: The probability of 'target' answer in each condition (including fillers)

Condition	***β***	***p*-value**
Covered filler	-1.24	0.001
Target filler	3.92	< 2e -16
SVO	2.00	8.91e -11
VSO	2.23	1.05e -12
VOS	1.88	1.05e -09

4.3 Discussion

The present study aimed to investigate the availability of inverse scope interpretation in doubly quantified sentences in Greek and whether different word orders (SVO, VSO, and VOS) affect this availability. The findings provide valuable insights into the interaction between syntax and semantics in Greek, contributing to the ongoing debate on quantifier scope ambiguities across languages.

Although the results of this study lack statistical significance, we can still draw some conclusions. First of all, our results confirmed that inverse scope interpretation is generally available to Greek speakers across all three examined word orders, aligning with recent cross-linguistic studies suggesting that scope ambiguity is more widespread than previously assumed (Scontras et al., 2017; Oikonomou et al., 2020). This finding

contradicts the traditional assumption that languages with free word order lack inverse scope readings, due to constraints on covert movement operations (Huang, 1982; Bobaljik & Wurmbrand, 2012).

Specifically, for VSO structures, the data indicate that both surface and inverse scope are available, which actually matches the predictions of Alexiadou and Anagnostopoulou (1998), who assume that VSO should allow both inverse and surface scope, unlike SVO, which allows only surface scope. Moreover, our results suggest that inverse scope is in fact, slightly more preferred compared to surface scope. This latter finding is inconsistent with our prediction that inverse scope reading of VSO structures are less accessible, because they require an additional movement step for their interpretation, as discussed in Chapter 2.1. This unexpected preference for inverse scope in VSO structures could be attributed to various factors. First, the design of the experiment or the specific pictures used may have confused the participants or favored the inverse scope interpretation. Additionally, pragmatic factors might have influenced participants' interpretations. Further research is needed to clarify the underlying reasons for this preference.

As far as SVO structures are concerned, our data suggest the availability of both scope readings, confirming the experimental results of Oikonomou et al. (2020). Our results indicate actually a strong preference for inverse scope readings, i.e., more than the 50% of the times. These findings support the hypothesis that subjects in SVO order are base-generated in SpecvP and move to SpecT, making both scopes readily accessible. However, the alternative CLLD analysis, proposed by Alexiadou & Anagnostopoulou (1998), according to which the subject raises to SpecTopP, and thus, blocks the inverse scope interpretation, is not confirmed by our findings. This might indicate that the preverbal subject in SVO structures does not consistently behave as a CLLD element, or that other factors, such as information structure or pragmatic factors, play a more significant role in scope interpretations than assumed.

Regarding VOS structures, our findings met our predictions by confirming the availability of both scope readings. Surface scope still proved to be the more preferred interpretation, which is consistent with the findings of Kechagias (2008), who argued that both scope readings should be available in VOS structures, though surface scope is easier to process due to its syntactic structure.

Finally, the random effects in the statistical analysis imply considerable inter-participant and inter-item variability, indicating that the availability of inverse scope in Greek cannot be solely explained by grammatical mechanisms. Instead, pragmatic factors likely play a crucial role in determining scope interpretations, as suggested by Brasoveanu and Dotlačil (2019).

To conclude, the availability of inverse scope in Greek provides further evidence against the traditional assumption that free word order languages lack scope ambiguity. Instead, the data suggest that Greek allows for a range of scope interpretations, even in marked word orders like VOS, potentially influenced by factors beyond syntactic constraints.

Conclusion

Overall, our findings failed to prove an effect of the word order -at least, of the examined ones- on the inverse scope interpretation of the doubly-quantified sentences. Although the results were statistically insignificant, they confirmed the availability of both scope readings in Greek. This aligns with the recent studies about various free-word order languages, which suggest that languages of this type, although not so flexible in scope interpretation, present scope ambiguity contra expectations.

Furthermore, the lack of significant fixed effects suggests that participants' interpretations of quantifier scope ambiguity are not strongly influenced by the tested conditions, namely the word order. This outcome underscores the complexity of quantifier scope ambiguity in Greek, and suggests that other linguistic or cognitive factors may play a critical role in this phenomenon.

Finally, our study had a lot of limitations. First of all, both the tested population and the dataset were considerably small, which might have affected the statistical results, and their significance. Moreover, the covered box paradigm might not be a sensitive enough experimental method to detect this effect, as it may provide evidence for the availability of the inverse scope reading, but it does not answer to which scope is the most preferred one under each condition. Lastly, the design of the pictures might have confused the participants, and led to controversial answers.

Future research on the topic should investigate the influence of other factors on the scope interpretation. Specifically, these factors can be pragmatic (e.g., give the sentence in various contexts) or syntactic (e.g., include different verb types to examine whether the theta-roles affect the scope reading; see, Zhou & Gao (2009) about Chinese). In addition, we suggest follow up experiments employing different experimental methods, and especially, real-time measurements (e.g., SPR or eye-tracking) for an insight on cognitive factors that might influence the scope interpretation.

All in all, the present study contributes to a growing body of literature challenging the assumption that scope ambiguity is strictly determined by language typology (e.g., rigid vs. free word order). Our findings underscore the complexity of quantifier scope ambiguity in Greek, and suggest that a more insightful understanding of the interplay

between syntax, semantics, and pragmatics is necessary to account for the observed patterns.

Data Management

A copy of the whole dataset (i.e., the experimental items including the pictures), the script of PCIbex, the cleaned data file, and the analysis script can be found here: https://osf.io/y6n8t/?view_only=2121c9e69c0449139afcbfa4f94d09a3

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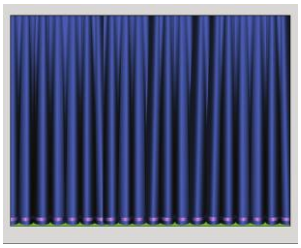
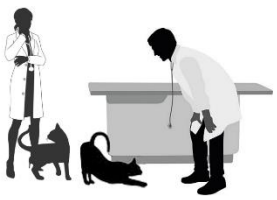
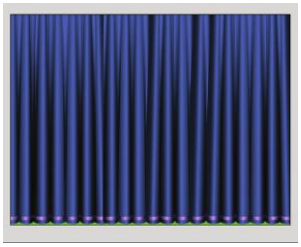
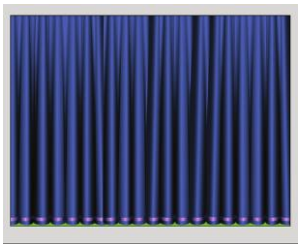
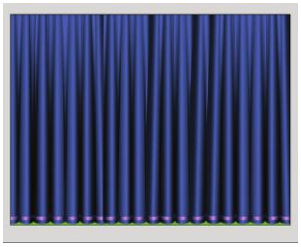
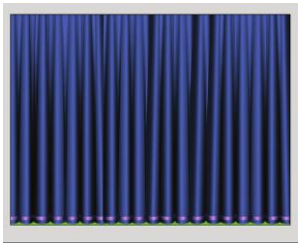
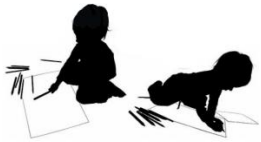
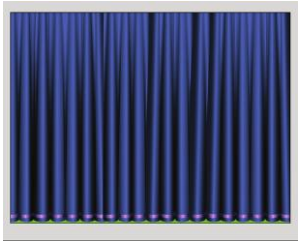
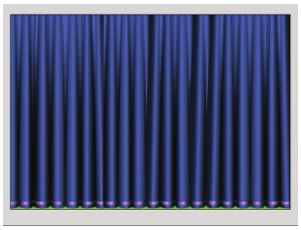
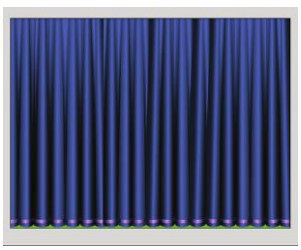
Appendix

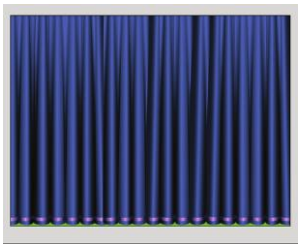
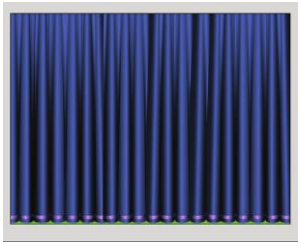
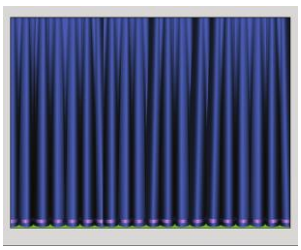
A. Test items

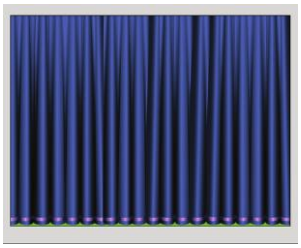
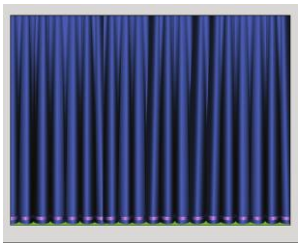
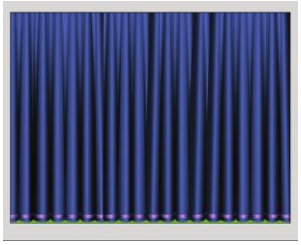
In the following table, the testing items in the three examined word orders are presented. Under each item, we provide the three pictures, i.e., the one representing the inverse scope ('target'), the one representing surface scope ('covered'), and the distractor. Item 13 was excluded from the analysis, as discussed in Chapter 3.

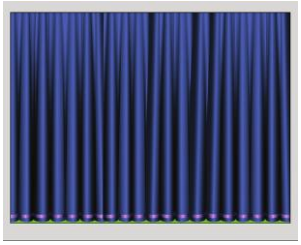
<table>
<tr><td rowspan="6">1</td><td>SVO</td><td colspan="3">Kapjos kipuros kladepse kathe dentro</td></tr>
<tr><td>VSO</td><td colspan="3">Kladepse kapjos kipuros kathe dentro</td></tr>
<tr><td>VOS</td><td colspan="3">Kladepse kathe dentro kapjos kipuros</td></tr>
<tr><td></td><td colspan="3">'Some gardener pruned every tree'</td></tr>
<tr><td rowspan="2"></td><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="6">2</td><td>SVO</td><td colspan="3">Kapjos ktiniatros peripiithike kathe gataki</td></tr>
<tr><td>VSO</td><td colspan="3">Peripiithike kapjos giatros kathe gataki</td></tr>
<tr><td>VOS</td><td colspan="3">Peripiithike kathe gataki kapjos giatros</td></tr>
<tr><td></td><td colspan="3">'Some vet nursed every kitten'</td></tr>
<tr><td rowspan="2"></td><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
</table>

3	SVO	Kapja mitera taise kathe moro		
	VSO	Taise kapja mitera kathe moro		
	VOS	Taise kathe moro kapja mitera		
		'Some mother fed every child'		
		Target picture	**Distractor**	**Covered picture**
				
4	SVO	Kapjos kleftis listepse kathe gineka		
	VSO	Listepse kapjos kleftis kathe gineka		
	VOS	Listepse kathe gineka kapjos kleftis		
		'Some thief robbed every woman'		
		Target picture	**Distractor**	**Covered picture**
				
5	SVO	Kapja gineka taise kathe skilo		
	VSO	Taise kapja gineka kathe skilo		
	VOS	Taise kathe skilo kapja gineka		
		'Some woman fed every dog'		
		Target picture	**Distractor**	**Covered picture**
				

6	SVO	Kapjo pedi diavase kathe vivlio		
	VSO	Diavase kapjo pedi kathe vivlio		
	VOS	Diavase kathe vivlio kapjo pedi		
		'Some child read every book'		
		Target picture	**Distractor**	**Covered picture**
				
7	SVO	Kapjos astinomos kinigise kathe klefti		
	VSO	Kinigise kapjos astinomos kathe klefti		
	VOS	Kinigise kathe klefti kapjos astinomos		
		'Some policeman chased every thief'		
		Target picture	**Distractor**	**Covered picture**
				
8	SVO	Kapja gineka agaliase kathe pedi		
	VSO	Agaliase kapja gineka kathe pedi		
	VOS	Agaliase kathe pedi kapja gineka		
		'Some woman hugged every child'		
		Target picture	**Distractor**	**Covered picture**
				

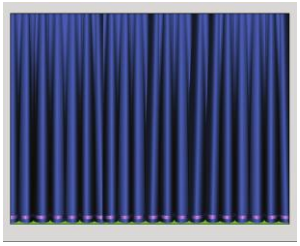
9	SVO	Kapjos andras epline kathe piato		
	VSO	Epline kapjos andras kathe piato		
	VOS	Epline kathe piato kapjos andras		
		'Some man washed every dish'		
		Target picture	**Distractor**	**Covered picture**
				
10	SVO	Kapja gineka kuvalise kathe valitsa		
	VSO	Kuvalise kapja gineka kathe valitsa		
	VOS	Kuvalise kathe valitsa kapja gineka		
		'Some woman carried every suitcase'		
		Target picture	**Distractor**	**Covered picture**
				
11	SVO	Kapjo pedi anixe kathe doro		
	VSO	Anixe kapjo pedi kathe doro		
	VOS	Anixe kathe doro kapjo pedi		
		'Some child opened every gift'		
		Target picture	**Distractor**	**Covered picture**
				

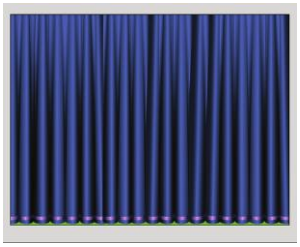
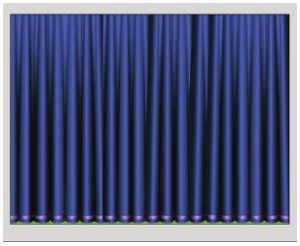
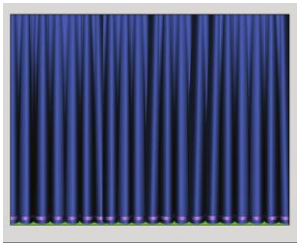
12	SVO	Kapja komotria kurepse kathe gineka		
	VSO	Kurepse kapja gineka kathe gineka		
	VOS	Kurepse kathe gineka kapja komotria		
		'Some hairdresser cut the hair of every woman'		
		Target picture	**Distractor**	**Covered picture**
				
13	SVO	Kapjos giatros eksetase kathe astheni		
	VSO	Eksetase kapjos giatros kathe astheni		
	VOS	Eksetase kathe astheni kapjos giatros		
		'Some doctor examined every patient'		
		Target picture	**Distractor**	**Covered picture**
				
14	SVO	Kapjo pedi ipefse kathe poni		
	VSO	Ipefse kapjo pedi kathe poni		
	VOS	Ipefse kathe poni kapjo pedi		
		'Some child rode every pony'		
		Target picture	**Distractor**	**Covered picture**
				

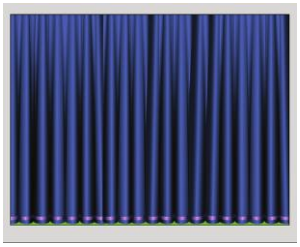
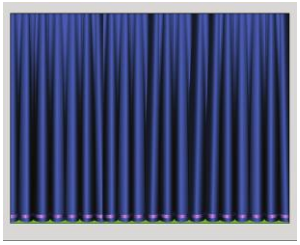
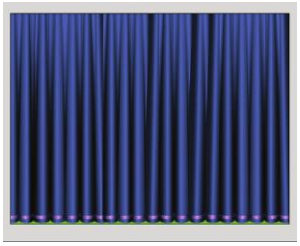
15	SVO	Kapjos zografos zografise kathe pinaka		
	VSO	Zografise kapjos zografos kathe pinaka		
	VOS	Zografise kathe pinaka kapjos zografos		
		'Some artist painted every painting'		
		Target picture	**Distractor**	**Covered picture**
				

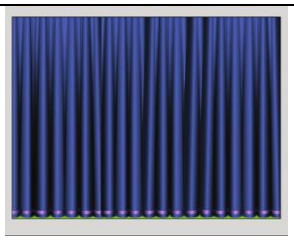
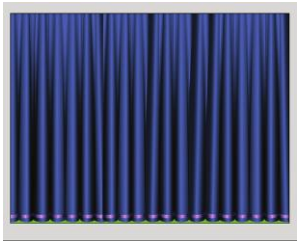
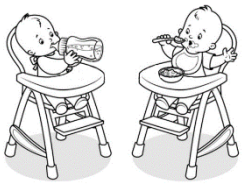
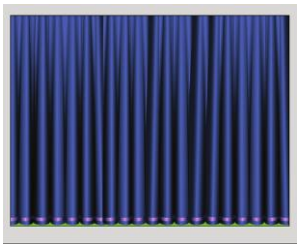
B. Fillers

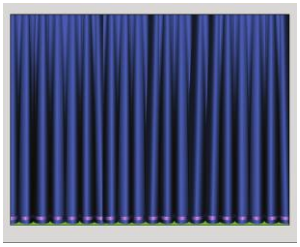
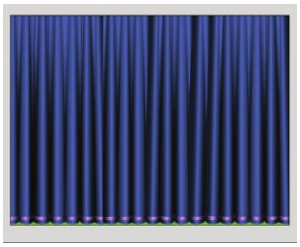
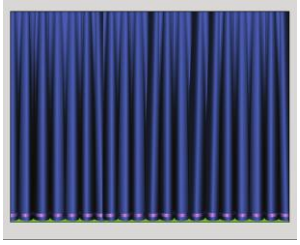
In the table below, we present the fillers together with the three pictures. For the fillers 1-8, the correct answer was the target picture, while for the rest of them both the uncovered pictures were wrong, thus the correct one was the covered picture.

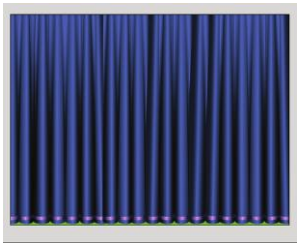
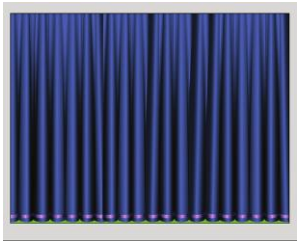
1	Kapjos ipurgos episkefthike to arheo mnimio		
	'Some minister visited the ancient monument'		
	Target picture	**Distractor**	**Covered picture**
			

<table>
<tr><td rowspan="4">2</td><td colspan="3">Forese mia gineka to makri forema</td></tr>
<tr><td colspan="3">‘A woman wore the maxi dress’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="4">3</td><td colspan="3">O fotografos fotografise to mnimio</td></tr>
<tr><td colspan="3">‘The photographer shot the monument’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="4">4</td><td colspan="3">O daskalos voithise kapjon mathiti</td></tr>
<tr><td colspan="3">‘The teacher helped some student’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
</table>

5	Epekse me ena pehnidi to pedi		
	'The kid played with a toy'		
	Target picture	**Distractor**	**Covered picture**
			
6	O komotis xtenise to montelo		
	'The hairdresser combed every model'		
	Target picture	**Distractor**	**Covered picture**
			
7	O mathitis egrapse sto tetradio		
	'The student wrote at the notebook'		
	Target picture	**Distractor**	**Covered picture**
			

<table>
<tr><td rowspan="4">8</td><td colspan="3">I mitera esmprokse to karotsi</td></tr>
<tr><td colspan="3">‘The mother pushed the stroller’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="4">9</td><td colspan="3">I gata epekse me to mpalaki</td></tr>
<tr><td colspan="3">‘The cat played with the ball’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="4">10</td><td colspan="3">Kapjo moro egafe tin krema</td></tr>
<tr><td colspan="3">‘Some baby ate the cream’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
</table>

11	Kapjos astinomos filai tin periohi		
	'Some polioceman guards the area'		
	Target picture	**Distractor**	**Covered picture**
			
12	Ena pedi den ipie gala		
	'A kid didn't drink milk'		
	Target picture	**Distractor**	**Covered picture**
			
13	Kapja nosokoma frontise ton astheni		
	'Some nurse took care of every patient'		
	Target picture	**Distractor**	**Covered picture**
			

<table>
<tr><td rowspan="4">14</td><td colspan="3">Kapjos skilos efage oles tis lihudies</td></tr>
<tr><td colspan="3">‘Some dog ate all the treats’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td rowspan="4">15</td><td colspan="3">To vivlio sto trapezi den ine megalo</td></tr>
<tr><td colspan="3">‘The book on the table is not big’</td></tr>
<tr><td>Target picture</td><td>Distractor</td><td>Covered picture</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
</table>