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## FULL PAPER

### Modern Greek Distributive Operator *Apo*

#### Abstract

The quantificational distributional properties of Greek preposition *apo* ‘from’ are the focus of this research. Our intention is to examine the quantificational distributional properties of Greek preposition *apo* ‘from’ in specific structures in which *apo* appears in the object position and it is combined with a numeral and a noun in the accusative; the subject position in this sentence, is occupied by either a subject NP or the quantifier *kathe(nas)* *each* and/or a noun.

We speculate that the semantic properties of this preposition resemble the qualities of Serbian preposition *po* as it occupies also the object position in the sentence and combines with a numeral and a noun, with quantifier *svaki* in the subject position.

We review Serbian *po* and compare it to the Greek *apo* since they both appear in similar syntactic structures and therefore, might welcome a similar quantificational interpretation. Our findings show that Greek *apo* is more than a distributive share which is how Knezevic and Demirdache (2018) describe Serbian *po*. Greek *apo* appears to share similar distributive qualities like universal quantifier *kathe* ‘every’ in specific syntactic constructions.

Research on this topic proves the universality of Quantification as it appears in natural languages in the form of distribution and could expand our understanding in the way such notion is processed mentally.

**Key words:** Semantics, universal quantification, distribution, Modern Greek

*Prepared by*

*A.Prof. Dr Zaina Tsouhlaris,  
Taibah University, Madinah, KSA.*

[zh1424@yahoo.co.uk](mailto:zh1424@yahoo.co.uk)

## Introduction

Quantification is a semantic phenomenon well described in Modern Greek with numerous quantifiers that appear in the form of NPs, QMods, partitives or even in the form of affixes. However, this paper is concerned with another Greek lexical item that appears to have distributive quantificational properties, that is the Greek preposition *από* ‘apo’.

Our intention is to examine the quantificational distributional properties of Greek *apo* in specific syntactic structures in which *apo* is combined with a numeral and a noun in the accusative. As we progress in our discussion, we might also need to refer to constructions where *apo* is combined with a quantifier and others where *apo* also combines with an NP.

Research on this topic could prove the universality of Quantification as it appears in natural languages in the form of distribution and could expand our understanding in the way such notion is processed mentally. Our research would also prove semantic similarities or differences between languages like Greek and Serbian.

Let us begin first by building a syntactic and semantic profile for the Greek preposition *από* ‘apo’.

## Chapter 1

### Building the profile of Modern Greek *από*

In order to begin our discussion, it is important to draw the syntactic and semantic profile of Modern Greek *από* ‘apo’. The Modern Greek preposition *από* ‘apo’ is a synonym of the preposition *έκ* (ek) which in Ancient Greek is constructed with a noun in genitive case, while in Modern Greek it is usually found in a construction with a noun in the accusative (see Proias Leksikon, 1965: 336).

#### 1.1. The Syntax of Modern Greek *από* ‘apo’

Holton et al (2006) state a variety of syntactic constructions Modern Greek *από* ‘apo’ occupies. At this point it is important to mention that Modern Greek *από* ‘apo’ is a preposition and therefore, it syntactically appears in constructions common to prepositions, that is preposition +NP in the accusative for Modern Greek constructions. Joseph & Philippaki-Warburton (1987) mention that a preposition ‘is typically placed immediately before a noun phrase in order to indicate the relation of this phrase to some other phrase. A phrase introduced by a preposition is known as a prepositional phrase.’ (Holton et al, 2006: 370).

Holton et al (2006) state that ‘*Από* is normally constructed with noun phrases (including emphatic personal pronouns) in the accusative’ (Holton et al, 2006: 380). There are several meanings attributed to Modern Greek *apo*; the meaning we are concerned with is that allows distributive use of this preposition. In this case the syntactic construction *apo* engages in is the one that involves *apo* to combine with a numeral and a noun in the accusative.

Holton et al (2006) mention the distributive use of Greek *από*. They believe that in distributive use, Modern Greek preposition *apo* is combined with a numeral as in Holton’s et al examples (14) and (15), mentioned below as (1) and (2); in this case, *apo* + numeral “is the equivalent of ‘numeral + each’:

(1) “*φάγαμε από δύο αύγά*

‘We ate two eggs **each**’” (Holton et al, 2006: 383).

They also discuss the possibility that “(T)he noun phrase introduced by *από* appears in the case appropriate to its function in the clause; for instance, *από* is followed by the nominative when the noun phrase functions as the subject of the clause:

(2) *Δεξιά και αριστερά υπάρχει από ένας τοίχος* (nom.)

‘There is a wall on **each** side’ [lit. ‘right and left there-is from one wall’]” (ibid).

We believe that Holton’s et al (2006) examples (14) and (15) are another piece of evidence that testifies to the quantificational properties of *από* and have triggered our interest to find out how quantificational *apo* is. In (14), *apo* is distributing the two eggs to the subject of the sentence while in

(15) *apo* is used to divide the wall into two parts and distribute half of the wall to the right and the other half to the left.

### 1.2. The Semantics of Modern Greek *από* ‘apo’

Greek *από* ‘apo’ is a preposition with several meanings according to Stavropoulos (1995). *από* ‘apo’ mainly means ‘from’ as in Greek sentence taken from Stavropoulos (1995):

(3) *από* τήν αρχή ως το τέλος

**Apo** tin arhi os to telos

‘**From** the beginning to the end’

However, many other meanings are attributed to *από* ‘apo’, depending on its syntax. Some are mentioned below:

(4) γράφτηκε *από* εμένα

Graftike **apo** emena

‘It was written **by** me’

(5) είναι καλύτερος *από* εμένα

Ine kaliteros **apo** emena

‘He is better **than** me’

(6) είμαι εδώ *από* τήν Κυριακή

Eimai edo **apo** tin Kiriaki

‘I’m here **since** Sunday’

(7) *από* ζήλεια

**Apo** zilia

‘**Out of** jealousy’

(8) κατέβηκε *από* το τραίνο

Katevike **apo** to treno

‘He got **off** the train’

In the above examples Greek *από* ‘apo’ translates as ‘from’, ‘by’, ‘than’, ‘since’, ‘out of’, and ‘off’ respectively. Stavropoulos (1995) fails to provide a thorough profile of *από* ‘apo’, since he does not mention the fact that this Greek preposition has distributive properties. Same is the case with Stafilidis (2000) who sums the possible meanings of *apo* as “1. From, out of; 2. By, through; 3. than” (Stafilidis, 2000: 986).

However, Babiniotis (2002) mentions that *από* ‘apo’ expresses επιμερισμό ‘epimerismo’ which means allocation, apportionment or distribution. Babiniotis also mentions that *apo* combines syntactically with a noun in accusative as in his example mentioned below:

(9) πήρε *από* 10,000 δραχ ο καθένας

pire **apo** 10,000 drahmes o kathenas’

‘**Each one** took 10,000 drachmas’

In his sentence, Babiniotis (2002) also combines *από* ‘apo’ with the Greek exhaustive distributive universal quantifier καθένας ‘kathenas’ which means ‘everyone’. This could be an indication that *από* ‘apo’ engages in specific syntactic constructions that allow it to receive a quantificational reading.

Holton et al (2006) also mention the “distributive use (of) *από* + numeral (which) is the equivalent of ‘numeral+each’” (Holton et al, 2006: 383).

Babiniotis’ (2002) and Holton’s et al (2006) comments on the distributive properties of *από* are our first confirmation to our speculations that *από* ‘apo’ can be quantificational and distributive.

## Chapter 2

### Describing the situation: default examples from Modern Greek

This chapter is concerned with the default examples we will consider in order to discuss the quantificational properties of Modern Greek preposition *από*.

These default examples will aid a thorough semantic investigation into the meaning and semantic function of Greek preposition *από* ‘apo’. They are mentioned below:

- (10) *τα παιδιά έφαγαν ενα μήλο*  
Ta pedia efagan ena milo  
‘The kids ate an apple’
- (11) *τα παιδιά έφαγαν ενα μήλο το καθένα*  
Ta pedia efagan ena milo **to kathena**  
‘The kids ate an apple **each**’
- (12) *τα παιδιά έφαγαν από ενα μήλο*  
Ta pedia efagan **apo** ena milo  
‘The kids ate **DISTRapo** one apple’
- (13) *τα παιδιά έφαγαν από ενα μήλο το καθένα*  
Ta pedia efagan **apo** ena milo to kathena  
‘The kids ate **DISTRapo** one apple each’
- (14) **to kathena** (apo ta paidia) efage **apo** ena milo  
**To kathena** (apo ta pedia) efage **apo** ena milo  
**‘Each (from the children) ate DISTRapo one apple’**

Also compare with the above:

- (15) \**το παιδί έφαγε από ένα μήλο*  
\*to pedi efage **apo** ena milo  
\*‘the kid ate **DISTRapo** one apple’
- (16) *το παιδί έφαγε ένα μήλο*  
To pedi efage ena milo  
‘The kid ate an apple’

A quick look at the examples mentioned above tells us that in a sentence *apo* needs to be preceded by a plural noun as a subject. Perhaps this is a second indication to its distributive properties; if the subject is in singular as in (8) it yells an ungrammaticality, while in (16) *to pedi efage ena milo*, where both the subject and the object are in singular, there are no distributive indications. However, if the subject is in plural, it encourages distributivity. Gil (1995) believes that “(S)emantically, universal quantifiers- simple or distributive-key- are of plural cardinality. Thus, NPs such as *all men* and *every man* characteristically specify or allude to sets containing more than one member. For example, in a context containing *n* men, the NPs *all men* and *every man* both refer to a set of cardinality *n*; since, in most contents,  $n > 1$ , all and every may be characterized as semantically plural.” (Gil, 1995: 327).

Therefore, we are going to concentrate on examples like those presented in (10)– (16).

Let us start with (10) *τα παιδιά έφαγαν ενα μήλο* (ta paidia efagan ena milo) ‘the children ate an apple’. Since there is complete absence of any quantifier in the sentence and absence of *apo* as well, this sentence is seen as a statement in the affirmative that allows no quantificational reading.

We need to pay more attention to examples (13) – (16).

Example (11) *τα παιδιά έφαγαν ενα μήλο το καθένα*, (ta paidia efagan ena milo to kathena) ‘the kids ate an apple each’ owes its quantificational reading to quantifier *kathenas* ‘every one’, which is known to be a universal distributional quantifier as described by Haspelmath (1995). Haspelmath mentions that “In Modern Greek, *καθίς* (<katheis) is the usual way to say ‘everyone’ (the Ancient Greek word

pas is only used in the very formal archaic variety). An abbreviated form of this, κάθε, serves as determiner ‘every’.” (Haspelmath, 1995: 377).

Stafilidis (2000) translates *kathenas* as “each, each one, everyone, everybody, anybody” (Stafilidis, 2000: 1097) and it appears to be the counterpart of English *each* and *every*. Stavropoulos (1995) mentions possible constructions with *kathenas* as repeated below:

(17) *kerdisame mia lira o kathenas*

‘We won a pound **each**’

(18) *kathenas mas*

‘**Each one** of us’

(19) *o kathenas mbori na to kani auto*

‘**Anyone** can do this’

Joseph & Philippaki Warburton (1987) mention that *kathenas* is a combination of Greek *kathe* ‘each’ with the declinable numeral *enas* ‘one’ in order to “form the compound quantifier καθένας (M), καθεμιά (F), καθένα (N), as in:” (Joseph & Philippaki-Warburton, 1987: 53) their examples (69) mentioned below:

(20) *kathenas fititis na feri ena filo tou*

‘**Each** (male) student should bring a friend of his’

We do not intend to give a full profile of the distributive quantifier *kathenas*; we superficially mention *kathenas* as a Greek universal quantifier because it appears in constructions with Greek *apo* which is the focus of this research. In addition, it substitutes *apo* and shares similar distributive, quantificational interpretation. It is also important to mention that *kathenas* is a floating quantifier that appears not only at the beginning of a sentence but also at the end as it is demonstrated in Joseph & Philippaki-Warburton’s example (71 a, b) mentioned below:

(21) *ta pedia na feroun (to) kathena (tous) ta lefta*

‘The children should bring **each one** (of them) the money’

(22) *ta paidia na feroun ta lefta (to) kathena (tous)*

‘The children should bring **each one** (of them) the money’

Therefore, it appears that according to Joseph & Philippaki-Warburton (1987), and Haspelmath (1995) Greek καθένας ‘kathenas’ is a Greek universal distributive quantifier that also has the ability to float. Haspelmath (1995) mentions that *kathenas* is derived from a distributive preposition *kata*; *kata* is an Ancient Greek preposition “(governing the Accusative case) with the basic locative meaning ‘along, throughout, all over’...” (Haspelmath, 1995: 376). *Kata* is found in *kathe* in the combination of “kath’hena (lit. ‘(one) by one’) came to be used in the sense of ‘every one’. Later *kath*’ was reinterpreted as a marker of universal distributivity rather than a distributive preposition, and non-accusative forms like *katheis* (Nominative), *kathenos* (Genitive), etc. were formed...” (Haspelmath, 1995: 377). Haspelmath mentions that “In Modern Greek, *kaθis* (<καθείς) is the usual way to say ‘everyone’ (the Ancient Greek *pas* is only used in the very formal archaic variety). An abbreviated form of this, κάθε, serves as determiner ‘every’...” (ibid).

Let us consider example (11):

(11) *ta paidia efagan ena milo to kathena*

‘The children ate an apple **each**’.

In this sentence the quantifier *kathena* ‘each one’ allows distributivity to take over and allow a distributive reading.

Let us now return to our own default example (12), repeated below, with the preposition *apo*:

(12) *ta paidia éfagan από ενα μήλο*

Ta pedia efagan **apo** ena milo

‘The kids ate an apple **each**’

Sentence (12) contains the preposition *apo* and translates in English as ‘the children ate each an apple’. The English translation favored for *apo* is the English quantifier *each*, allowing a distributive reading. The subject being in plural also allows distribution to take place, so that the children can eat an apple each; therefore, if we have 3 children, we should also have 3 apples. *Each* in English is also a distributive universal quantifier and it is considered to be the English counterpart of Modern Greek *kathenas*. Both, *kathenas* and its English counterpart have been openly classified as a quantifier, universal, exhaustive and distributive.

Compare now (12) *ta paidia efagan apo ena milo* ‘the children ate an apple each’ to our next example (13):

(13) τα παιδιά έφαγαν **από** ενα μήλο **το καθένα**

ta paidia efagan **apo** ena milo to **kathena**

‘The kids ate an apple **each**’

Our example (13) contains both the preposition *apo* and the quantifier *kathenas*; in an attempt to translate the sentence, we could say ‘the children ate an apple each’ and again we notice the presence of English quantifier *each* in the translation of example (13).

Are *apo* and *kathenas* given a similar quantificational analysis so that when they stand alone in the sentence, they carry out the quantificational reading but when both co-exist in the sentence, one becomes the quantifier and the other is used more to intensify the quantificational reading since it does not add anything else to the sentence? This is our speculation so far, which will be resolved with the help of a questionnaire.

We look for answers to these speculations in Gil (1995), Knezeric & Demirdache (2018), Bosnic & Spenader (2019) and Bosnic, Demirdache & Spenader’s (2021) treatment of Serbian *po*. A comparison of Modern Greek *apo* to Serbian *po* might lead us to the right conclusions about the quantificational properties of Greek **από**.

First let us explore all possible syntactic constructions with **από**.

### 2.1. *apo* + numerals +NP acc

Examples (12) and (13) mentioned in Chapter 2 show that Modern Greek **από** combines with a numeral and a noun in accusative. See below (12) and (13):

(12) τα παιδιά έφαγαν **από** ενα μήλο

Ta pedia efagan **apo** ena milo

‘The kids ate **DISTRapo** one apple’

(13) τα παιδιά έφαγαν **από** ενα μήλο **το καθένα**

Ta pedia efagan **apo** ena milo to **kathena**

‘The kids ate one apple **each**’

This is also the construction mentioned in Holton et al (2006) that allows the distributive use of **από**, in their example (13) mentioned in 1.1. as example (1).

Holton et al (2006) believe that in distributive use, Modern Greek preposition *apo* is combined with a numeral in order to give the equivalent meaning of ‘numeral + each’ as in example (1) mentioned in Chapter 1, borrowed from Holton et al:

(1) “φάγαμε **από** δύο αυγά

‘We ate two eggs **each**’” (Holton et al, 2006: 383).

### 2.2. *apo* + quantifiers

The main syntactic construction *apo* is found is *apo* + numeral; however, it is possible for *apo* to combine with quantifiers.

Let us examine the following examples:



- (23) a. Edosa sta paidia **apo ola** ta frouta  
 Gave1SGPast to-the children **apo all** the fruit  
 ‘I gave to the children **DISTRapo all** the fruit’  
 b. Edosa sta paidia **apo ola** ta mila.  
 Gave1SGPast to-the children **apo all** the apples  
 ‘I gave to the children **DISTRapo all** the apples’
- (24) a. Edosa sta paidia **apo to kathe(na)** frouto  
 Gave1SGPast to-the children **apo the every** fruit  
 ‘I gave the children **DISTRapo every** fruit’  
 b. Edosa sta paidia **apo merika** frouta  
 Gave1SGPast to-the children **apo some** fruit  
 ‘I gave the children **DISTRapo some** fruit’  
 c. edosa sta paidia **apo liga** frouta  
 Gave1SGPast to-the children **apo a bit** fruit  
 ‘I gave the children **DISTRapo some** fruit’
- (25) a. pare (dio) **apo ola** ta frouta  
 Take (two) **apo all** the fruit  
 ‘Take two **DISTRapo all** the fruit’  
 b. Pare (dio) **apo to kathe(na)** frouto  
 Take (two) **apo the every** fruit  
 ‘Take (two) **DISTRapo every** fruit’
- (26) den perneis **apo kanena** (frouto)  
 Not take **apo none** (fruit)  
 ‘Do not take **DISTRapo any** fruit’

Examples (23 a, b) and (24 a) show that *apo* can combine with strong universal Greek quantifiers: the collective *ola* ‘all’ and the distributive *kathe(na)* ‘each, every’.

The meaning implied in (23a) is that we have a variety of fruits on the table, the children are taking some quantity of every fruit we have. Therefore, if we have apples, oranges, bananas and grapes, the children are taking some apples, some oranges, some bananas and some grapes; it is necessary that the children take some quantity from every fruit on the table. In (23b) if we have red apples, green apples and yellow apples on the table, the person is ought to take some quantity of the red apples, some quantity of the green apples and some quantity from the yellow apples.

Example (24a) has the same meaning with the difference that *kathe(na)* ‘each, every’, as it specifies that the children should take some fruit from each of the fruit we have, that is some from the apples, some of the oranges, some of the bananas and some of the grapes.

Examples (24b, c) show that *apo* can combine with weak existential quantifiers *ligo* ‘a few’ and *meriko* ‘some’. The meaning in (24b) would be that the children took some apples, some oranges, some bananas and some grapes; while in (24c) the children took a bit of apples, a bit of oranges, a bit of bananas and a bit of grapes.

In example (25a) *apo* is combined with universal quantifier *ola* ‘all’ which means that if there are apples, oranges, bananas and grapes on the table you ought to take two from each of the fruits on the table. Therefore, you ought to take two apples, two oranges, two bananas and two bunches of grapes.

The meaning of example (25b) is identical to the meaning of (25a); the difference is only in the syntax. In example (25a) *apo* combines with collective universal quantifier *ola* ‘all’ while, in (25b) *apo* is combined with distributive universal *kathe(na)* ‘each, every’.

What *apo* achieves in all these examples is to allow distribution no matter what the distributed quantity might be.

Example (26) is a construction that involves negation with negative quantifier *kanena* 'none'. *Den perneis apo kanena (frouto)* means that there is no distribution allowed, so that whoever wants fruit will take no fruit. *Apo* here allows distribution in zero quantity. Therefore, if we have apples, oranges, bananas and grapes on the table, whoever wants fruit will take zero apples, zero oranges, zero bananas and zero grapes.

In all cases *apo* allows distribution.

To understand how distributive *apo* can be in such environments like the above, it would help if we present a scenario as in (27):

(27) O pateras ehei 18 mila kai edose **apo ola** ta mila sta tria tou paidia.

The father has 18 apples and he-gave **apo all** the apples to-the three his children

'The father has 18 apples and gave **DISTRapo** all the apples to his 3 children'

Our scenario involves a father who has 18 apples and 3 children. He distributes the 18 apples to his 3 children in a way that he gives from all the apples to each child, so that if he has 6 red apples, 6 green apples, and 6 yellow apples, each child will have to take 2 apples of each color: 2 red, 2 green and 2 yellow apples, so that **all** the 18 apples are distributed to the 3 children.

Similarly, we can have scenarios (28) and (29) where *apo* is combined with existential quantifiers *ligo* 'some, a few, a bit' and *meriko* 'some, few' to allow distribution.

(28) O pateras ehei 18 mila kai edose **apo liga** mila sta tria tou paidia

The father has 18 apples and he-gave **apo a few** apples to-the three his children

'The father has 18 apples and gave **DISTRapo** a few to his three children'

(29) O pateras ehei 18 mila kai edose **apo merika** sta tria tou paidia

The father has 18 apples and he-gave **apo some** to-the three his children

'The father has 18 apples and gave **DISTRapo** some to his three children'

*Apo* in scenarios (28) and (29) also allows distribution with the difference that the 18 apples are unevenly distributed to the 3 children because quantifiers like *ligo* 'some, a few, a bit' and *meriko* 'some, few' do not specify exact quantities but some approximate quantity. Therefore, in (28) 18 apples (6 red, 6 green and 6 yellow) are distributed to the 3 children: John, Mary and Peter, so that some apples are distributed but not all. John has taken 1 red apple, 2 green apples and 1 yellow. Mary has taken 3 red apples, 2 green apples and 2 yellow. While Peter has taken 1 red apple, 2 green and 2 yellow. In (29) the numbers of the distributed apples to the 3 children will be slightly bigger to show 'some' quantity but never like example (27) where the distribution is exhaustive. In (27) and (28) we might have apples that have not been distributed to the 3 children.

### 2.3. *apo* + NP acc

(30) O pateras edose sta dio tou paidia **apo** ta mila (ohi **apo** ta portokalia)

The father he-gave to-the two his children **apo** the apples (not **apo** the oranges)

'The father gave to his two children **DISTRapo** the apples, not **DISTRapo** the oranges'

(31) O pateras edose sta dio tou paidia **apo to megalitero peponi** (ohi **apo** to mikrotero)

The father he-gave to-the two his children **apo** the biggest melon (not **apo** the smallest)

'The father gave to his two children **DISTRapo** the biggest melon (not **DISTRapo** the smallest)'

(32) O pateras edose sta dio tou paidia **apo to kreas** (ohi **DISTRapo** to kotopoulo)

The father he-gave to-the two his children **apo the meat** (not **apo** the chicken)

'The father gave to his two children **DISTRapo** the meat (not **DISTRapo** the chicken)'

Example (30) means that two children took some quantity from the apples but not from the oranges. If we have John and Mary, then John took some quantity from the apples and Mary took some quantity



from the apples, not necessarily the same quantity; the important thing is that they both took some apples, but no oranges. *Apo* is combined with the noun in the accusative. If the sentence did not have *apo* then it would imply that the two children together (collectively) took all the apples.

Same is the meaning of examples (31) and (32). John took a quantity from the bigger melon and Mary too some quantity from the bigger melon too. Similarly, in (32) John took some quantity from the meat and Mary also took some quantity from the meat.

In general, there is no case of distribution in these examples where *apo* combines with a noun phrase.

It appears that *apo* also takes part in partitives like in example (31) where the noun is understood through context.

*Apo* is clearly distributive in these examples, even though it allows some quantity to be taken by the children and not all.

#### **2.4. *apo* as a prepositional prefix**

Preposition από will be “(απ- before vowels, αφ- before vowels preceded by /h/ in AG)” (Holton et al, 2006:179) where AG stands for Ancient Greek.

Prepositional prefix *apo* is found in words like “αποσύνθεση ‘decomposition’, απομαγνητισμός ‘demagnetization’, αφαλατώνω ‘I desalinate’” (Holton et al, 2006: 180) where από- means (‘de-‘). It is important to mention at this point that από as a prepositional prefix has no apparent distributive use; however, further research can enlighten this superficial conclusion.

### **Chapter 3**

#### **Modern Greek *apo* in the shade of Serbian *po***

Our intention is to build a semantic profile of Modern Greek από, taking into consideration specific syntactic constructions it occurs in; therefore, it is important to make the connection between Greek *apo* and Serbian *po* in the sense of Knežević & Demirdache (2018), Bosnic & Spenader (2019) and Bosnic, Demirdache & Spenader (2021).

Following this path, we will be able to judge how quantificational *apo* is and under which syntactic/semantic circumstances.

#### **3.1. Serbian *po* according to Knežević & Demirdache (2018)**

Knezevic & Demirdache (2018) discuss the syntactic constructions Serbian *po* occupies; they describe “Serbian sentences with the universal quantifier *svaki* (every) in subject position and the distributive marker *po* in object position” (Knezevic & Demirdache, 2018: 116).

They also state that semantically “*po* is strongly distributive (blocking collective readings) and yields both atomic and non-atomic distributive construals ...” (ibid).

Knezevic & Demirdache (2018) analyze a possible quantificational reading mentioning that “the distributive-key denotes the event participant over which the distribution takes place, while the distributive-share denotes the entity that is being distributed (over the distributive-key).” (Knezevic & Demirdache, 2018: 117).

Knezevic (2015) argues that, in Serbian, the universal quantifier *svaki* ‘every’ is a distributive-key marker, while distributive *po* is a distributive-share marker, while, Knezevic and Demirdache (2018) assume that “following Choe (1987) that distributive shares are dependent indefinites denoting an explicit quantity” (Knezevic and Demirdache, 2018: 118).

Serbian *po* “occupies a fixed position in the sentence immediately preceding the NP serving as distributive-share” (Knezevic and Demirdache, 2018: 118). Knezevic & Demirdache (2018) wonder of what are the differences between a distributive key marker and a distributive share and whether distributive share markers like *po* can be analyzed like universal quantifiers.

They clarify that “distributivity is a relation between a distributive-key and a distributive-share” (Knezevic & Demirdache, 2018: 117); “the distributive-key denotes the event participant over which



In their example (10) with *svaki* ‘every’ we have a participant distributive reading and a collective reading and this is because *svaki* ‘every’ is a universal quantifier which enforces exhaustivity, in a way that it will not accept the possibility of a girl not painting a box, while others do.

*Svaki* is not only exhaustive but it also enforces atomic distribution.

An atomic distributive reading would mean that if “the set of two girls is partitioned atomically and each girl atom of this set is the agent of a box painting event” (ibid). Therefore, as Knezevic & Demirdache’s example (11b), there is a set of four girls partitioned into non-atomic sets of two girls, and each of these subsets of girls is the cumulative agent of a box painting event.

*Po*, on the other hand, does not allow atomic distribution and for this reason, they interpret the semantics of a sentence with *po* which means that there is “a striking contrast between the truth conditions ... with *po* versus .... with *svaki*/every” (Knezevic & Demirdache, 2018: 123).

They believe that *po* enforces strong distributivity and does not allow collective reading when there is a *po*-numeral in object position, according to their findings. Similarly, *po* does not enforce atomicity where the *po*-numeral is in subject position and “what is thus being distributed are quantities of three girls” (Knezevic & Demirdache, 2018: 125).

In cases of sentences that include both *svaki* and *po*, Knezevic & Demirdache (2018) believe that they should be strong distributive, exhaustive and atomic, because of the semantics of Serbian *svaki* ‘every’.

### 3.1.1. Greek *apo* in the shade of Knežević & Demirdache (2018) and Serbian *po*.

Greek *apo* and Serbian *po* follow the same syntactic construction. Knezevic & Demirdache (2018) mention the syntactic constructions Serbian *po* occupies which, in our opinion, are the same like those of Greek *apo*. Like their Serbian counterparts, Greek *apo* and *kathenas* also co-exist in the same sentence as seen in our default example (13). Distributive Greek *kathenas* occupies the subject position just like Serbian *svaki* while *apo* like distributive marker *po* is found in object position (see Knezevic & Demirdache, 2018: 116).

Following the analysis of Knezevic & Demirdache (2018), in our example (14) *to kathena (apo ta paidia) efage apo ena milo* ‘each ate an apple’, the preposition *apo* would be classified as a distributive-key in the object position that denotes the event participant (given by the verb *efage* ‘ate’) over which the distribution takes place while the distributive-share *kathenas* in the subject position denotes the entity that is being distributed over the distributive-key. Therefore, if we have 3 people who are eating apples, we would presume that in order for everyone to eat an apple we must have also 3 apples. In that case there is an exhaustive and equal distribution between the consumers and the consumed product.

Let us consider a different example: *ta koritsia vafoun ena kouti*, which reflects Knezevic & Demirdache’s (2018:117) example (1b) *The girls are painting a box*.

In this example “either all the girls are painting a box together (collective) or distributive reading where each girl paints a (different) box; the NP *girls* is said to serve as a distributive-key and the NP ‘box’ as a distributive-share, since a box is distributed over the members of the group of girls” (ibid).

In our equivalent sentence in Greek: *ta koritsia vafoun ena kouti* ‘the girls are painting a box’ there is also ambiguity whether the girls all together painted one box or whether they all painted different boxes.

However, if we were to use the same sentence with *apo* as in *ta koritsia vafoun apo ena kouti* ‘the girls are painting a box each’, where *apo* is translated as ‘each’, *apo* would not allow a collective reading and it would enforce a distributive reading.

The situation described in Serbian by Knezevic & Demirdache (2018) seems to be the same in Modern Greek with preposition *apo*.

Serbian *po* ‘occupies a fixed position in the sentence immediately preceding the NP serving as distributive-share’ (Knezevic & Demirdache, 2018: 118). Greek *apo* also has a fixed place in the sentence, always preceding the NP serving as distributive-share as we see in (14) *to kathena efage apo ena milo* ‘Each ate from an apple’ or (12) *ta paidia efagan apo ena milo* ‘the children ate apo an apple’, where *ena milo* ‘an apple’ is the distributive-share NP that denotes the entity to be distributed. There would be no other possible positions for *apo* in the sentence. Any attempt to place *apo* in any other position in the sentence would result in ungrammaticality as in example (33 a, b, c) mentioned below:

- (33) a. \**To paidi efage ena milo apo*  
 ‘\*The child ate an apple **apo**’  
 b. \**To paidi efage ena apo milo*  
 ‘\*The child ate one **apo** apple’  
 c. \**To paidi apo efage ena milo*  
 ‘\*The child **apo** ate one apple’

Another important observation would be the fact that *apo* cannot float in the sentence contrary to the universal quantifier *kathenas* ‘each, every’, which is a Floater Quantifier as Joseph & Philippaki-Warburton (1987) demonstrate in their examples (69-73) mentioned below:

“c. indefinite noun phrases accompanied by the declinable numeral *enas* (M), - *mia* (F)- *ena*(N), which fulfils some of the functions of an indefinite article; in this case, *kathe* precedes the form of *enas* (etc.) and combines with it to form the compound quantifier *kathenas*(M)- *kathemja*(F)- *kathena*(N), as in:

- (69) *kathenas fititis na feri ena filo tu*  
 Each-NOM.MASC.SG student-NOM.MASC.SG PRT bring-3SG a+friend-ACC his  
 ‘Each (male) student should bring a friend of his’

d. noun phrases with a definite article as well as the numeral form combined with *kathe*, in which case the definite article precedes the quantifier, as in:

- (70) *o kathenas fititis na feri ena filo tu*  
 The+each-NOM.MASC.SG student-NOM.MASC.SG PRT bring-3SG a+friend-ACC his  
 ‘Each (male) student should bring a friend of his’

The difference in meaning between sentences such as (69) and ones such as (70) is minimal; with the definite article ...the quantifier has a more emphatic feel to it and is perhaps best glossed as ‘each and every’.

The forms of *kathe* that combine with *ena* (etc.) can occur away from the noun phrase they modify, if that noun phrase is plural in form, and optionally they can be followed by a possessive pronoun referring back to the modified noun phrase; the definite article is optional with such “floated” forms of *kathena*-, e.g.:

- (71a) *ta pedja na feroun (to) kathena (tus) ta lefta*  
 The+children-N.NOM. PRT bring3PL the+each+one-N.NOM.SG them-GEN  
 the+money

‘The children should bring, each (one of them), the money’

- (71b) *ta pedja na feroun ta lefta (to) kathena (tus)*” (Joseph & Philippaki-Warburton, 1987: 54).

What we have found so far is that Greek *apo* engages in quantificational readings, but we still need to give evidence to its function as a quantifier.

The sentences Knezevic & Demirdache (2018) use when they discuss the possible universal quantificational properties of Serbian *po* are semantically and syntactically similar to their Greek equivalents. Let us explore these.

In their paper “Universal Quantification and Distributive Marking in Serbian” they discuss Serbian preposition *po* and label it as a distributive share marker, while the Serbian *svaki* is considered to be a distributive key marker similar to English *every*.

We should mention here that there is no English equivalent to Serbian preposition *po* or Modern Greek preposition *apo*.

Knezevic & Demirdache (2018) show that we have Exhaustivity with Universal Quantifier *svaki* and Atomicity reinforced with distributive *po*. *Po* is strongly distributive but *svaki* is pseudo-distributive. The Questionnaire we have prepared will be able to shed light on how similar to Serbian is the situation in Greek.

### 3.2. Serbian *po* according to Bosnic & Spenader (2019).

Bosnic & Spenader (2019) discuss the “distributive force of *po*” (Bosnic & Spenader, 2019: 95) and clarify that the Serbian “- *po* is also a preposition, verbal prefix, adjectival prefix and a distributive marker” (Bosnic & Spenader, 2019: 103).

They carry out an experiment with the intention to find out how young participants understand the different interpretations of *po* and how they learn them. They also carry out the same experiment with Dutch *elke* and *iedere* which show similarities with Serbian *svaki* and *po*.

In the constructions they discuss, *po* combines with Serbian *svaki* which was also discussed by Knezevic & Demirdache (2018). They show that “Serbian children are significantly late in acquiring both DK and DS markers and that there is a third distributive competitor that potentially affects the acquisition of these markers. A good follow up study would be to test children and compare *svaki*, *po* and *svaki-po* constructions in order to identify potential differences.” (Bosnic & Spenader, 2019: 106).

We are not interested in their experiment but we feel we can make use of some important data mentioned in their article in order to have a better understanding of the syntactic and semantic behavior of Serbian *po*, which might resemble Greek *apo* in terms of syntax and semantics.

Bosnic & Spenader (2019) mention that “(L)anguages across the world have different ways of conveying a distributive reading with different markers of distributivity. The major classification of abnominal distributive markers is in between distributive key (DK) and distributive share (DS) markers (Choe 1987). This classification arises from the different syntactic and semantic properties these markers have, and, as a result, they yield different readings. The fundamental syntactic difference between the two is whether the marker attaches to an argument associated with the restrictor set (also called **distributive key**), marking what is being distributed over (e.g. English *each* is associated with *child* in (1a) and *the children* in (1b), or to an argument associated with the scope of the sentence (also called **distributive share**), marking what is being distributed (e.g. Serbian marker *po* is associated with one present in (2)): (Bosnic & Spenader, 2019: 94).

Below we mention their examples (1) and (2):

“(1) [**Each child**] is carrying a present

(2) Deca nose [po jedan poklon].

Children.NOM carry.PL DISTR one present.ACC

“Children are carrying one present each” (ibid)

Both English (1) and Serbian (2) yield distributive readings. Bosnic & Sperader (2019) argue that (2) could also allow a collective reading if the children as a group are carrying the present all together, which they demonstrate through images.

Example (2) of Bosnic’s & Sperader can also have “event-distributive readings, where it is possible to distribute one-present-carrying events over time and space” (Bosnic & Sperader, 2019: 95).



Bosnic & Sperader (2019) mention the distributive force of *po* and confirm the possibility of using *svaki* ‘every’ with *po* as it is in Greek sentence with distributive *apo* and quantifier *kathenas* ‘every’. The syntax of *svaki* and *po* was also discussed in Knezevic & Demirdache (2018). “Their assumptions were that the combination of the two markers would block collective readings and enforce both exhaustivity (i.e. exhaustively using the DK set) and atomicity (i.e. distributing down to individuals), yielding results similar to English each.” (Bosnic & Sperader, 2019: 96). In their experiment “(a)dults responded as they predicted (accepted only distributive exhaustive and atomic scenarios)” (ibid). We will not concentrate on their experiment and the results with their young participants because we focus on the way *svaki* and *po* are used by adult speakers of the Serbian language, either combined or individually. They describe *svaki* as a distributive quantifier and *po* as a DS marker. Their sentence (4) quoted below, shows the exact construction with *po*:

« (4) a. Dečaci guraju dva /tri autića.

Boys are pushing two /three toy cars

b. Svaki dečak gura dva /tri autića.

Every boy is pushing two /three toy cars.

c. Dečaci guraju po dva /tri autića.

Boys are pushing DISTR two /three toy car

The answers to their experiment allow the following readings: “distributive, simple (1-to-1) distributive and collective” (Bosnic & Spenader, 2019: 98). According to the images they use to explain each answer, distributive means that each boy took 3 toys/cars, so that we have 3 boys and 9 toys/cars; simple (1-to-1) distributive would mean that every boy took one toy/car, so that we have 3 boys and 3 toys/cars; such an answer is “somewhere between giving distributive and giving collective answers” (Bosnic & Spenader, 2019: 102), and finally the collective reading would mean that all the 3 boys took 3 toys/cars, so that we have 3 boys and only 3 toys/cars that all the boys together took.

Regarding the collective reading, they claim that “collective responses can only be correct in the null condition, and should be rejected if the sentence is quantified or *po*-marked” (Bosnic & Spenader, 2019: 101).

They follow Knežević & Demirdache (2018) that children learn the truth conditions of *po* prior to *svaki* “because the truth conditions of *po* ... are less restrictive and therefore simpler. *Po* is non-atomic and nonexhaustive, while *svaki* places atomicity and exhaustivity constraints on its interpretation” (Bosnic and Spenader, 2019: 103).

Bosnic & Spenader (2019) claim that “the marker *po* can co-occur with universal quantifiers, such as *all* or *every* in Serbian, while Knezevic & Demirdache (2018) state that “*po* only combines with indefinite, or better, non-specific, cardinal expressions, as well as weak quantifiers” (Knezevic & Demirdache, 2018: 118).

Example (6) of Bosnic & Spenader (2019) is mentioned below:

« (6) Svaki dečak gura po tri autića.

every boy push DISTR three toy-cars

“Each boy is pushing three toy cars.” (Bosnic & Spenader, 2019: 106).

We have already mentioned the study by Knežević & Demirdache (2018), and what is especially interesting is that the combination of *svaki* (every) and *po* essentially yields an interpretation of a sentence comparable to a sentence with binominal *each*. *Each*, unlike *every*, is a strictly individual distributive quantifier, and since *svaki* is more like *every*, a direct corresponding word for *each* does not exist in Serbian. Instead, the effect of *each* is achieved when *po* and *svaki* cooccur in the same sentence.” (Bosnic & Spenader, 2019: 106).

### 3.2.1. Greek *apo* in the shade of Bosnic & Spenader (2019).

Knezevic & Demirdache (2018) and Bosnic & Spenader (2019) agree that *svaki* and *po* can be together in the same constructions as long as *svaki* like English *every* is in the subject position marking what is being distributed over -as a DK- while *po* is in the object position marking what is being distributed -as a DS.

We have already mentioned the study by Knežević & Demirdache (2018), and what is especially interesting is that the combination of *svaki* (every) and *po* essentially yields an interpretation of a sentence comparable to a sentence with binominal *each*. *Each*, unlike *every*, is a strictly individual distributive quantifier, and since *svaki* is more like *every*, a direct corresponding word for *each* does not exist in Serbian. Instead, the effect of *each* is achieved when *po* and *svaki* cooccur in the same sentence.” (Bosnic & Spenader, 2019: 106). However, in Greek, we have *kathe* that is equivalent to English *each* and *kathe(nas)* is the equivalent of English *every* (see Haspelmath, 1995).

Let us compare the semantics of Serbian *svaki* and *po* to Modern Greek *kathe* and *apo* as they appear in similar syntactic constructions.

Let us consider Bosnic & Spenader’s (2019) examples (4a), (4b) and (4c) mentioned below:

- “(4) a. Decaci guraju dva/tri autica  
Boys are pushing two/three toy cars  
b. Svaki decak gura dva/tri autica  
Every boy is pushing two/three toy cars  
c. Decaci guraju po dva/tri autica  
Boys are pushing DISTR two/three toy cars

Reflecting Serbian examples (4a), (4b) and (4c), we present their Greek counterparts:

- (34) *Ta agoria sprohnoun dio/tria autokintakia*  
The boys are pushing two/three toy cars  
(35) *kathe agori sprohni dio/tria autokinitakia*  
Every boy is pushing two/three toy cars  
(36) *ta agoria sprohnoun apo dio/tria autokinitakia*  
The boys are pushing **DISTRapo** two/ three toy cars

(34) is the Greek equivalent to Serbian (4a); (35) is the Greek equivalent to Serbian (4b) and (36) is the Greek equivalent to Serbian (4c).

Greek (34) like Serbian (4a) is distributive and collective. Greek examples (35) and (36) are as distributive as Serbian examples (4b) and (4c).

From examples (34), (35) and (36) it appears that we have the same constructions in Greek and a similar semantic interpretation.

### 3.3. Serbian *po* according to Bosnic, Demirdache & Spenader (2021).

Bosnic, Demirdache & Spenader (2021) explore distributivity from a different point of view, other than Bosnic & Spenader (2019) with the Serbian *po*-phrase, and pose the question: “(A)re distributive-share markers universal quantifiers or are they event plurality markers?” (Bosnic 2021: 5). They test sentences with *po* and present “two competing approaches to the semantics of distributive-share markers: they are either universal distributive quantifiers over events or are merely event-plurality markers” (Bosnic et al, 2021: 1).

Bosnic, Demirdache & Spenader (2021) carry out two experiments “with Serbian transitive sentences in which the distributive-share marker *po* was attached to the direct object. The first two experiments investigated exhaustivity effects in transitive sentences with *po*, while the third experiment probed homogeneity effects across three types of negative transitive sentences: with *po* marking the object, with the distributive-key quantifier *svaki* (‘every’) in subject position, and with neither.” (ibid).

Bosnic et al (2021) speculate that “(I)f *po* is a universal quantifier, then it should enforce exhaustive distribution over a distributive key and remove homogeneity effects in negative sentences with a definite subject. If instead *po* is an event-plurality marker with no universal quantificational force, then it should neither enforce exhaustive distribution nor remove homogeneity effects in negative sentences with a definite subject.” (ibid).

They start their discussion with exploring sentences with English *each* considering *each* as a distributive marker which forces distributive readings of ambiguous sentences, as they say and describe in their examples (1) a and b, quoted below:

“(1) a. Each boy is holding two balloons

→ Two balloons per boy

b. The boys are holding two balloons

→ Two balloons in total

(or two balloons per boy as a less preferred option).” (Bosnic et al, 2021: 3)

They explain that “(F)or a distributive reading to hold, there has to be a pairing of two arguments, the distributive key and the distributive share (in the terminology of Gil 1982, Choe 1987, Gil 1995). The distributive key is the plural argument denoting the set over which distribution is taking place (in (1a), it is boy, the restriction of the universal quantifier), while the distributive share is the argument denoting what is being distributed (two balloons).” (ibid).

Bosnic et al (2021) also believe that “(D)istributive-key markers such as each are considered to be distributive universal quantifiers, and, according to Gil 1995, this status is a typological universal. As universal quantifiers, distributive-key markers require all members of the set interpreted as the distributive key to exhaustively participate in the described event; for example, for (1a), each boy in the contextually given set must participate in holding two balloons.” (Bosnic et al, 2021: 4).

We should mention that English lacks distributive-share markers such as Serbian *po*.

Bosnic et al (2021) example is quoted below:

“(2) a. Dečac-i drž-e [**po dva balon-a**].

Serbian boy-pl.nom hold-prs.3pl **distr two balloon-paucal.acc**

‘(The) boys are holding **distr two balloons**.’” (Bosnic et al 2021: 4).

They clarify that “(D)istributive-share markers differ not only syntactically from distributive-key markers but also semantically. The general consensus is that distributive-share markers such as *po* ... offer a broader spectrum of possible interpretations, yielding distribution over individuals but also allowing distribution over events (Lasersohn 1998, Oh 2006). Thus, the sentences in (2), for instance, straightforwardly allow a participant- or individual-distributive reading where sets of two balloons are distributed over boys (partitioned atomically: i.e., each boy is individually relevant)” (ibid).

But they also explain that such sentences “also allow event-distributive readings where the event of balloon holding is broken down/partitioned into a contextually determined number of subevents involving (at least) one boy holding two balloons. These (sub)events of boys carrying sets of two balloons are partitioned/distributed temporally or spatially. On the temporal event-distributive reading, boys are carrying, individually or together, sets of two balloons at different times. On the spatial event-distributive reading, boys are carrying two balloons individually or together at different locations but at the same time. While the temporal reading allows the same or different boys to be carrying the same or different sets of two balloons on each occasion, the spatial reading requires the balloon-holding events to take place simultaneously at different locations, and hence there will have to be different boys per event (Gil 1990, Oh 2006, Knežević 2015)” (ibid). They believe that “*po* lacks a core property of universal distributive quantifiers: *po* does not require its distributive key to be exhaustively distributed over by members of the distributive share.

(3a) below can only be used to describe the scenario that is atomic (involving individual, one-to-one pairing) and exhausted, so that we can have 3 children and 3 suitcases so that each child carries a suitcase.

“(3) a. The children are carrying one suitcase each.

English

b. Dec-a

nos-e

po

jedan

kofer-∅.

Serbian

children-nom carry-prs.3pl **distr one suitcase-acc**

‘(The) children are carrying distr one suitcase.’” (Bosnic et al, 2021: 5).

Serbian (3b) can receive 4 different interpretations; first, it can be atomic and exhaustive as its English counterpart so that we are dealing with 3 children and 3 suitcases;

In the second interpretation we can have a distributive atomic but not exhaustive reading so that some of the children carry a suitcase; therefore, if we have 4 children, 3 of them could be carrying a suitcase each. Therefore, we could have 4 children but 3 suitcases and this is a non-exhaustive reading.

The third interpretation allows us to have groups of children that carry a suitcase per group; in this case we can have 6 children divided into 3 groups that carry 3 suitcases. This is a non-atomic and exhausted reading while, the fourth is a non-atomic and non-exhausted reading that allows groups of children to carry two suitcases so that we deal with 7 children divided into 3 group but 2 suitcases carried by certain groups but not others.

Because of these 4 interpretations “Knežević (2015) rejects the universal quantification analysis by claiming that *po* lacks a core property of universal distributive quantifiers: *po* does not require its distributive key to be exhaustively distributed over by members of the distributive share” (Bosnic et al, 2021:5) and proposes “that *po* and similar distributive-share makers simply signal plurality of events” (Bosnic et al, 2021: 6).

This explanation is based on Bosnic et al (2021:5) illustrations (a-d).

Bosnic et al (2021) mention Knežević (2015) and conclude that “exhaustivity and atomicity are both irrelevant to the truth conditions of *po*. Crucially, *po* cannot be analyzed as involving universal quantification since it lacks this defining property of a universal quantifier: the meaning of a sentence with *po* does not enforce exhaustive/universal distribution over a distributive key (forming the restriction of the quantifier). Knežević’s proposal is that *po* and similar distributive-share makers simply signal plurality of events” (Bosnic et al, 2021:6).

Bosnic et al (2021) argue that what allows a universal quantifier to be such is exhaustivity and not atomicity. They explain that by providing two reasons: “(i) because even a universal quantifier such as every allows so-called partially distributive readings, unlike each, which obligatorily distributes down to individuals (e.g., John photographed every /\*each student but not separately)<sup>5</sup>, and (ii) because distributive-share markers also allow spatiotemporal distributive readings, and time is a continuous noncount domain and thus cannot be partitioned atomically” (Bosnic et al, 2021: 6).

### 3.3.1. Greek *apo* in the shade of Bosnic, Demirdache & Spenader (2021).

The conclusions derived from Bosnic et al (2021) are that if *po* is a universal quantifier, then it should enforce exhaustive distribution over a distributive key and remove homogeneity effects in negative environments. If Greek *apo* is a universal quantifier that is exhaustive, distributive and atomic will be determined by the results of our questionnaire. However, at this point we should mention that the homogeneity test cannot be carried out in Greek since *kathe(nas)* can only be translated as *none* and not as *not any*, which is possible in English.

In addition, it appears that for a distributive reading to hold there must be a pairing of two arguments, the DK and the DS, where the DK is the plural argument denoting the set over which distribution is taking place and DS is the argument denoting what is being distributed. At this point, this is the case of

syntax of Greek *apo*. Therefore, we can say that in example (12) *ta paidia efagan apo ena milo, ta paidia* ‘the children’ is the plural argument -DK-, a set over which distribution takes place; while *apo ena milo* ‘DISTR one apple’ is the DS- that is the argument denoting what is being distributed.

*Po* is seen as being semantically able to yield distribution over individuals so that every child takes one apple, or it also allows distribution over events so that each child must participate in the event of eating an apple. This is the case with Greek *apo* and the semantic interpretation it enforces in sentences where it is present, in the object position.

Bosnic et al (2021) conclude that *po* lacks a core property of universal distributive quantifiers, since *po* does not require its Distributive Key to be exhaustively distributed over by members by the Distributive Share. This might not be the case with Greek *apo*. We will depend on our questionnaire to give us the correct results of the quantificational character of Greek *apo*. Therefore, the fact that *po* does not enforce exhaustive/universal distribution over a DK could be one of the reasons *po* is semantically different from Greek *apo* even though they both occupy the same syntactic construction as explained previously.

### **3.4. A cross linguistic analysis between Serbian *po* and Modern Greek *apo*: similarities and differences**

From a first glance, Greek *apo* seems to share similarities with Serbian *po* in terms of Syntax and Semantics.

Greek *apo* and Serbian *po* follow the same syntactic construction with or without Greek *kathe(nas)* and Serbian *svaki*. Knezevic & Demirdache (2018) mention the syntactic constructions Serbian *po* occupies which, in our opinion, are the same like those of Greek *apo*. Like their Serbian counterparts, Greek *apo* can be found in sentences on its own or like Serbian *svaki* and *po*, *apo* and *kathenas* can co-exist in the same sentence as seen in our default example (13).

When *apo*, like *po*, appears in construction on its own, it occupies the object position and combines with a numeral and an NP in the accusative.

On the other hand, distributive Greek *kathenas* occupies the subject position just like Serbian *svaki* while *apo*, like distributive marker *po*, is found in object position (see Knezevic & Demirdache, 2018: 116). Following the analysis of Knezevic & Demirdache (2018), in our example (14) *to kathena (apo ta paidia) efage apo ena milo* ‘each ate an apple’, the preposition *apo* would be classified as a distributive-key in the object position that denotes the event participant (given by the verb *efage* ‘ate’) over which the distribution takes place while the distributive-share *kathenas* in the subject position denotes the entity that is being distributed over the distributive-key. Therefore, if we have 3 people who are eating apples, we would presume that in order for everyone to eat an apple we must have also 3 apples. In that case, there is an exhaustive and equal distribution between the consumers and the consumed product.

Serbian *po* ‘occupies a fixed position in the sentence immediately preceding the NP serving as distributive-share’ (Knezevic & Demirdache, 2018: 118). Greek *apo* also has a fixed place in the sentence, always preceding the NP serving as distributive-share as we see in (14) *to kathena efage apo ena milo* ‘Each ate from an apple’ or (12) *ta paidia efagan apo ena milo* ‘the children ate apo an apple’, where *ena milo* ‘an apple’ is the distributive-share NP that denotes the entity to be distributed. In addition, both *po* and *apo* cannot be placed in any other part of the sentence and do not float.

As it appears from Bosnic & Spenader (2019) the combination of *svaki* (every) and *po* essentially yields an interpretation of a sentence comparable to a sentence with binominal *each*. *Each*, unlike *every*, is a strictly individual distributive quantifier, and since *svaki* is more like *every*, a direct corresponding word for *each* does not exist in Serbian. Instead, the effect of *each* is achieved when *po* and *svaki* cooccur in the same sentence.” (Bosnic & Spenader, 2019: 106). However, in Greek, we



have *kathe* that is equivalent to English *each* and *kathe(nas)* with is the equivalent of English *every* (see Haspelmath, 1995).

According to Bosnic et al (2021), Serbian *po* is seen as being semantically able to yield distribution over individuals so that every child takes one apple, or it also allows distribution over events so that each child must participate in the event of eating an apple. This is the case with Greek *apo* and the semantic interpretation it enforces in sentences where it is present.

We should also mention that in Greek it is not possible to carry the homogeneity test because Greek universal distributive quantifier *kathe(nas)* can only be translated as *none* and not as *not any*.

Another point of difference is the one mentioned by Knezevic & Demirdache (2018: 118): the possible combination of *po* with weak quantifiers -even though they don't provide any examples of this case-, while in 2.2. we have discussed cases in which Greek *apo* combines with weak and strong quantifiers in object position.

The questionnaire in the following chapter 4 will clarify the situation and will be able to show how exhaustive, distributive and atomic is Greek *apo* in comparison to Serbian *po*. After all, these three are the main prerequisites for a lexical item like *apo* to be classified as a quantificational operator.

#### Chapter 4

##### Our Questionnaire and its analysis

Our questionnaire was based on questionnaires carried out by Bosnic et al (2021) and Knezevic & Demirdache (2018); it will allow us to clarify the situation with Modern Greek *apo* and build its semantic profile.

Our questions were addressed to a group of 10 native speakers of Modern Greek, who also speak English as a second language.

The default examples were the following sentences in Modern Greek, which include construction with Greek universal quantifier *kathe*, with Greek preposition *apo*, and constructions with both *kathe* and *apo*, or constructions with neither of them.

What we were testing was to which extent these sentences could be examples of constructions that express exhaustivity, distributivity and atomicity in their semantic interpretation, which are all properties of universal quantifiers.

Our default examples:

- (37) Ta paidia metaferoun **apo** mia valitsa  
'The kids are carrying **DISTRapo** one suitcase'
- (38) Oi maimoudes kratane **apo** mia ombrella  
'The monkeys are holding **DISTRapo** one umbrella'
- (39) Ta koritsia bafoun **apo** ena kouti  
'The girls are painting **DISTRapo** one box'
- (40) **Kathe** koritsi evapse ena kouti  
'**Each** girl painted one box'
- (41) dio koritsia vafoun ena kouti  
'Two girls are painting one box'
- (42) **Apo** dio koritsia vafoun ena kouti  
'**DISTRapo** two girls are painting one box'
- (43) Tria koritsia kratoun **apo** dio ballonia  
'Three girls are holding **DISTRapo** two ballons'
- (44) **Apo** tria koritsia kratoun dio ballonia  
'**DISTRapo** three girls are holding two balloons'
- (45) **Kathe** koritsi vafi **apo** ena kouti

- ‘Each girl is painting **DISTRapo** one box’
- (46) a. **Kathe** koritsi pire dio ballonia ‘Each girl took two ballons’  
 b. **Kathe** koritsi pire **apo** dio ballonia ‘Each girl took **DISTRapo** two ballons’  
 c. Ta koritsia piran **apo** dio ballonia ‘The girls took **DISTRapo** two balloons’  
 d. Ta koritsia piran dio ballonia ‘The girls took two balloons’
- (47) a. **Kathe** koritsi pire dio ballonia ‘Each girl took two ballons’  
 b. **Kathe** koritsi pire **apo** dio ballonia ‘Each girl took **DISTRapo** two balloons’  
 c. Ta koritsia piran **apo** dio ballonia ‘The girls took **DISTRapo** two balloons’  
 d. Ta koritsia piran dio ballonia ‘The girls took two balloons’
- (48) a. **Kathe** koritsi pire dio ballonia ‘Each girl took two ballons’  
 b. **Kathe** koritsi pire **apo** dio ballonia ‘Each girl took **DISTRapo** two balloons’  
 c. Ta koritsia piran **apo** dio ballonia ‘The girls took **DISTRapo** two balloons’  
 d. Ta koritsia piran dio ballonia ‘The girls took two balloons’

In our questionnaire, our default examples are accompanied by drawings that are intended to ease the understanding of the meaning of the sentence and produce more accurate results.

According to our results, the informants agree that sentence (37) *ta paidia metaferoun apo mia valitsa* ‘The kids are carrying ‘from’ one suitcase’ allows an **atomic and exhaustive reading**.

Sentence (38) *Oi maimoudes kratane apo mia ombrella* ‘The monkeys are holding ‘from’ one umbrella’ allows **exhaustivity** in the individuals it **distributes** one umbrella, so that each individual holds one umbrella only.

Example (40) *Ta koritsia bafoun apo ena kouti* ‘The girls are painting ‘from’ one box’ also takes an **exhaustive/atomic reading**, so that each girl paints one and only box.

Example (40) *Kathe koritsi evapse ena kouti* ‘Each girl painted one box’ takes an **atomic and distributive** reading, so that it allows each girl to paint one box only.

Example (41) *dio koritsia vafoun ena kouti* ‘Two girls are painting one box’ lacks both the universal quantifier *kathe* and the preposition *apo*. According to the results of the questionnaire, this sentence allows a **non-atomic, exhaustive and non-distributive** reading which proves that the preposition *apo* is necessary to make the reading atomic, exhaustive and distributive like in our examples (39) and (40). *Apo* is as necessary as *kathe* is for a quantificational interpretation (see examples 45a, 45b, and 45c).

Example (42) *Apo dio koritsia vafoun ena kouti* or *Apo dio koritsia vafitike ena kouti* ‘From’ two girls are painting one box’ makes use of the preposition *apo* and results in a **non-atomic, exhaustive and non-distributive**, so it allows two girls together to paint a box. This is a result that derives from a construction where *apo* is combined with the numeral *dio* ‘two’. The reading could be atomic if *apo* was combined with numeral *ena* ‘one’ as in example (38).

Example (43) *Tria koritsia kratoun apo dio ballonia* ‘Three girls are holding ‘from’ two ballons’ takes an **atomic, distributive** reading according to our informants, so that every girl holds 2 balloons. Therefore, we have 3 girls and 6 balloons in total, equally distributed.

Example (44) *Apo tria koritsia kratoun dio ballonia* ‘From’ three girls are holding two balloons’ is regarded by the majority of informants as a **non-atomic, distributive** context so that every 3 girls hold 2 balloons.

Example (45) *Kathe koritsi vafi apo ena kouti* ‘Each girl is painting ‘from’ one box’ takes a unified answer that allows an **atomic, distributive** reading, so that each girl paints one box only. The number of girls is equal to the number of painted boxes.

Our example (46) consists of 4 sentences of different constructions. Examples (46a) *Kahe koritsi pire dio ballonia* ‘Each girl took two ballons’ (46b) *Kathe koritsi pire apo dio ballonia* ‘Each girl took ‘from’ two ballons’ and (46c) *Ta koritsia piran apo dio ballonia* ‘The girls took ‘from’ two balloons’ make use either of *apo* or *kathe* which are both **distributive and quantificational** and allow the same meaning so that, every single girl takes 2 ballons in her hands. Sentence (46d) *Ta koritsia piran dio ballonia* ‘The girls took two balloons’ has a different interpretation of that of sentences a, b and c, since it does not employ either *kathe* or *apo*.

Our example (47) makes use of the same sentences like in example (46) but examines their semantics from a different perspective. The question it poses is whether these sentences can be translated as ‘Each and every girl took 2 balloons’, where *kathe* or *apo* allow all the girls in the group to hold 2 balloons each in her hands without exception and therefore, all 3 sentences allow the interpretation of *kathe* and *apo* as ‘each and every’. ‘Each and every’ is **exhaustive, atomic and distributive**. In their answer our informants agree that only sentences (47a), (47b) and (47c) can be interpreted as ‘each and every’ but not (47d).

Our last example (48) also uses the same 4 sentences we used in examples (46) and (47). The difference is that in (47) we are questioning how exhaustive are *kathe* and *apo*. The answer is that in (47a, b and c) in the same **distributive, atomic, exhaustive** reading. Sentence (47d) does not allow the same interpretation.

The above results allow us to think of *kathe* and *apo* equally **quantificational, exhaustive, atomic and distributive** since sentences with *kathe*, sentences with *apo* and sentences with both *kathe* and *apo* take the same interpretation.

Our intention is to show that *apo* is semantically equal to Greek universal quantifier *kathe* in terms of distributive quantification. Criteria that allow us to think that *apo* is a distributive universal quantifier like Greek *kathe* would be the following:

- 1) If *apo* is a distributive universal quantifier must be exhaustive, distributive like Greek *kathe* and English *every* (see Haspelmath 1995).
- 2) *apo* must allow atomic readings
- 3) sentences with *apo* should allow the same interpretation like sentences with *kathe*

The results of our questionnaire show that all 3 criteria are met. The results show that *apo* and *kathe* are interchangeable in meaning; *apo* can substitute *kathe* (see examples 45/46/47 a, b, c) and result in the same distributive, atomic, exhaustive reading which makes *apo* a quantifier semantically equal to distributive *kathe* ‘every’. Based on this, we are inclined to consider *apo* as quantificational as *kathe* ‘every’ and not as a distributive marker as the Serbian *po* (see Bosnic et al (2021) and Knezevic & Demirdache (2018)).

## Chapter 5

### Conclusions: Greek *apo* similar to *kathe(nas)* according to our questionnaire results

A questionnaire has been carried out among adult native speakers of Greek in order to draw the correct conclusions about the quantificational distributive properties of Greek *apo*.

Speculations guided us to consider Greek *apo* in purely distributive environments as quantificational as *kathe* ‘every’.

From the results of our questionnaire, it appears that because of its ability to stand alone in the sentence and convey the same distributive meaning, *apo* could be a universal quantifier like *kathe* ‘every’, especially since it is purely distributional, exhaustive and atomic.

A universal distributive quantifier should be exhaustive and according to Bosnic et al (2021) should enforce exhaustive distribution over a distributive key. In our analysis in chapter 4, we have seen that this is exactly how *apo* functions in specific syntactic environments, that is *apo* + Num + N acc.

From the results of our questionnaire, it appears that:

- a. *apo* can be translated as ‘each and every’ to show exhaustivity, in a similar way *kathe* can be given the same translation;
- b. in its semantic interpretation *apo* allows the possibility to have an equal number of distributed entities and participants to whom the entities are being distributed;
- c. in terms of atomicity *apo* allows that each entity can be distributed to each participant

Our questionnaire reveals similarities between *apo* and *kathe* and justifies the reason why they can both co-exist in the same sentence and give an equal meaning like those sentences made with either one.

As we have already explained *apo* must combine with a numeral and a noun in the accusative placed in the object position in order to give a distributive reading.

A distributive operator is able to indicate reference to each individual member of the set which is exactly what *apo* is responsible for doing in our default sentence (48) *ta paidia piran apo ena milo* ‘the children took an apple each’.

Without *apo* in the sentence, the distributive reading would be ambiguous as in (49) *ta paidia piran ena milo* ‘the children took an apple’ and it could be easily interpreted as a collective reading meaning that the children all together took an apple. It is the semantics of *kathe* and *apo* that can change the collective reading of sentence (49) into a distributive, exhaustive and atomic reading as shown in (48) and (50):

(48) *Ta paidia piran apo ena milo*  
The children took **apo** one apple  
‘The children took an apple **each**’.

(49) *Ta paidia piran ena milo*  
The children took one apple  
‘The children took an apple’

(50) **Kathe** *paidi pire ena milo*  
‘**Each** child took an apple’

It is also possible to have (51):

(51) *To kathe paidi pire apo ena milo*  
The **each** child took **apo** one apple  
‘Each child took **DISTapo** one apple’

In (51) *kathe* and *apo* have the same responsibility of distributing one apple to each child.

Example (51) makes obvious the quantificational properties of the NP *to kathe paidi* and *apo* aids in the distribution of the apples. According to our results in our questionnaire, sentences with *apo*, sentences with *kathe* and sentences with both *kathe* and *apo* are equally distributive, exhaustive and atomic which leads us to consider *kathe* and *apo* of similar quantificational strength, because they don’t only co-exist in the sentence but when they appear on their own in a sentence, they give the same interpretation of distributivity.

Initially, we speculated that the relationship between *apo* and *kathe(nas)* is that between distributive-key and distributive-share. Distributive-key is the plural argument denoting the set over which distribution is taking place (i.e. *ta paidia* or *to kathe paidi*) in subject position, while distributive-share is the argument denoting the entity that is being distributed (i.e. *ena milo*) in the object position and under the shade of *apo* + numeral.

However, after the results of the questionnaire, it is apparent that *apo* and *kathe* share similar exhaustive, atomic, distributive properties common to distributive quantifiers.

Holton et al (2006) state that in its distributive use *apo*+numeral “is the equivalent of ‘numeral+each’” (Holton et al, 2006: 383) which also reflects the English translation of our default example (12) *ta paidia efagan apo ena milo* ‘the children ate an apple each’. If then *apo* is responsible for a distributive reading which is also exhaustive and atomic, it would be rightly analyzed as a distributive quantifier, semantically equal to Greek universal quantifier *kathe(nas)*.

In addition, in chapter 2 we discuss the possibility of *apo* combining with weak and strong quantifiers; in examples (23) – (29) *apo* is able to enforce distributivity when the quantifier is in the object position (instead of a numeral) and as part of the argument denoting what is being distributed. This is another proof of the distributive qualities of *apo*. When *apo* combines with a numeral it quantifies over a specific quantity given by the numeral while, when *apo* combines with a quantifier it quantifies over any proportion specified by the quantifier it combines with.

Babiniotis (2002) is clear about *apo* expressing επιμερισμό ‘epimerismo’ which means distribution. Our informants who participated on our questionnaire confirm that *apo* is not only distributive but also exhaustive and atomic as a universal quantifier, as discussed in Bosnic, Demirdache & Spenader (2021).

*Apo* blocks collective readings as in example (48) and enforces exhaustivity and atomicity as in example (47a, b, c). Bosnic et al (2021) mention that a universal quantifier should enforce exhaustive distribution, as *apo* does in our questionnaire results.

A sentence with *apo* enforce exhaustive/universal distribution over a distributive key (forming the restriction of the quantifier) because as described by Knezevic (2015).

The syntax of ‘*apo* + numeral + NP acc’ leads us to a semantic distributive reading like in (48) in which the plural argument in the subject position denotes the set over distribution takes place and the ‘numeral + NP acc’ in the object position is the argument that denotes what is being distributed. The same interpretation is with sentences with *kathenas* which is responsible for the distribution in the sentence- see example (50).

Knezevic & Dermidache (2018: 123) state that *po* is not atomic; however, our informants in our questionnaire have agreed that *apo* is atomic, exhaustive and distributive and blocks collective readings.

*Apo* could favor either analysis as being responsible for distribution over individuals or for distribution over events, as previously explained in the case of Serbian *po*. Further research could be carried on the formalization of Greek *apo* and Serbian *po* which might pin point to their semantic similarities/differences.

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