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# INTONATION, NEGATION AND SCOPE IN GREEK UNIVERSAL QUANTIFIERS AND NPI-UNIVERSALS

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## ABSTRACT

*The goal of this study is to test experimentally two hypotheses about NPIs and universal quantifiers in Greek and their scopal interaction with negation. The first hypothesis emerges from the claim that Greek ‘emphatic’ NPIs are NPI-universals that take scope above negation (Giannakidou 1998, 2000, 2006). In this theory, emphasis (i.e. pitch accent) on the NPI functions as morphological marking that distinguishes lexically the NPI-universal from its non-emphatic counterpart which is licensed broadly as an existential quantifier in non-veridical contexts (and is parallel to any). The second hypothesis is that intonation in Greek generally marks wide scope of a quantifier above negation (Giannakidou 1998, 2000, Baltazani 2002). To test these hypotheses we set up a task that requires subjects to map emphatic and non-emphatic intonations onto scenarios with total (wide scope universal) and partial negation (narrow scope universal with respect to negation). We find that subjects uniformly choose the wide scope universal scenario for emphatic NPIs, suggesting indeed a robust association of the NPI-construal with wide scope, as predicted by Giannakidou’s theory. We find, however, more variable judgments with the universal quantifier *oli* ‘all’, suggesting that the second hypothesis, namely that emphatic intonation signals wide scope with respect to negation, is less robust. The difference between our two findings suggests may be taken to reflect a difference between morphological marking and scope marking, which applies at the level of prosody.*

## 1. Background: emphatic and non-emphatic NPIs in Greek

Greek has two NPI paradigms, distinguished by ‘stress’ (Veloudis 1982, Giannakidou 1997 et seq., Tsimpli and Roussou 1996):

(1)	kanénas/KANÉNAS	‘anyone, anybody/no-one, nobody’
	kanénas N/KANÉNAS N	‘any N/no N’
	típota/TÍPOTA	‘anything/no thing’
	poté/POTE	‘ever/never’
	puthená/PUTHENA	‘anywhere/nowhere’
	kathólu/KATHOLU	‘at all/not at all’

Upper-case letters indicate emphatic accent. *Kanénas* is the masculine, *kamía* is the feminine, *kanéna* is the neuter. Since Veloudis’s original observation, the two paradigms have been treated as distinct because they exhibit systematic differences in distribution, interpretation and overall behavior, a brief summary of which we give below. The accent is not indicative of focus movement for reasons that have been discussed elsewhere (Giannakidou 1997, and 1998, pp. 227–231). Giannakidou 1998, 2000 notes that other quantifiers, e.g. *polí* ‘much’ and *líji* ‘few’ also come in emphatic and non-emphatic variants corresponding to lexical contrasts in English, and suggests to handle the emphatic NPIs as lexically distinct from the non-emphatic ones. Emphatic accent therefore functions as a morphological marking that Greek appears to employ more broadly.

Under negation and antiveridical *without* both paradigms are licensed:

- (2) a. Dhen idhe {típota/TÍPOTA} o Jánis. Greek  
not saw anything the Johh  
John didn't see anything.  
b. \* Idhe {típota/TÍPOTA} o Jánis.  
John saw anything.
- (3) xoris na dhi {kanénan/KANÉNAN}.  
without subj see.3sg n-person  
without having seen anybody.

So, both paradigms— emphatic and non-emphatic— are NPIs and need negation. But the two differ in a number of important respects:

(i) *Fragment answers*

Only the emphatic can give a successful fragment answer:

- (4) - Pjon idjes? “Who did you see?”  
- {KANÉNAN/\*kanénan}  
Nobody/\*Anybody.

The ability to answer negatively as a fragment is the hallmark property of NPIs known as *n-words* (Laka 1990; Zanutini 1991, Giannakidou 2006). The emphatic NPI can be used as a negative fragment answer, but the non-emphatic NPI cannot. Giannakidou 1997, 1998, 2000 argues that the fragment NPI is the remnant of an elliptical structure, and “given that the remnants in fragment answers are accented, non-emphatics are excluded because they are not accented. Considering that utterances with non-emphatics typically involve pitch accent on negation, we may argue alternatively that ellipsis excludes non-emphatics because the accented negation itself must be deleted.” (Giannakidou 2000: 469). The negative fragment answer does not entail that the emphatic word is negative, since the structure contains ellipsis that itself contains negation.

(ii) *Licensing in islands*

Another difference between emphatic and non-emphatic NPIs with negation concerns locality. Non-emphatic NPIs, but not emphatic NPIs, are licensed in syntactic islands. The example below illustrates this with a relative clause (but other examples are given in Giannakidou 1998; see also Quer 1993 for a similar observation about Catalan *n-words*):

- (5) Dhen prodhosa mistiká [pu ekséthesan {kanénan/\*KANÉNAN}]  
betrayed.1st secrets that exposed.3pl n-person  
I didn't reveal secrets that exposed anybody.

In this respect, non-emphatics are like *any*, which is also licensed in islands as we see in the translations. Importantly, the inability of KANÉNAN to be licensed in the island was one of the arguments in Giannakidou that set apart the emphatic NPI from a focus in situ which is typically fine in islands (see also Tsimpli 1995).

(iii) *Long distance licensing*

Given that non-emphatics appear in islands, it is not surprising that they also appear long-distance, again like *any*. Notice too the contrast with the emphatic NPI:

- (6) I Ariadne dhen ípe oti ídhe {típota/\*TÍPOTA}.  
the Ariadne not said.3sg that saw.3sg n-thing  
Ariadne didn't say that she saw anything.

The observed locality of the emphatic NPI is again typical of negative concord, and is reminiscent of universal quantifier dependencies, which are also clause-bounded (for Greek, see Farkas and Giannakidou 1996).

(iv) *Strict negative concord, and n-words as strong NPIs*

Greek exhibits *strict* negative concord, i.e. it always requires the presence of negation for the licensing of the emphatic NPI:

- |     |   |  |           |
|-----|---|--|-----------|
| (7) | a | KANÉNAS *(dhen) ípe TÍPOTA.<br>n-person not said.3sg n-thing<br>'Nobody said anything.'  | Greek     |
|     | b | Nikt *(nie) uderzył nigogo.<br>n-person not hit.3sg n-person<br>'Nobody hit anybody.'  | Polish    |
|     | c | Balázs *(nem) beszélt senkivel semmiről.<br>Balázs not spoke.3sg n-person n-thing<br>'Balázs didn't talk about anything with anybody.' | Hungarian |

Greek, Hungarian, Japanese, Korean, and Slavic languages form a natural class in terms of strict negative concord, and require sentential negation even when more than one n-word occurs in a sentence. It is in this sense that n-words in these languages are strong NPIs: they need negation to be licensed (Giannakidou 1998, 2000), and cannot appear in non-negative nonveridical or downward entailing contexts:

- (8) Píjes {poté/\*POTE} sto Parísi?  
*went.2sg ever in-the Paris*  
Have you ever been to Paris?
- (9) An dhis tin Eléna {puthená/\*PUTHENA}, na tis milísis.  
If you see Eléna anywhere, talk to her.
- (10) Pare {kanéna/\*KANÉNA} milo.  
*take.imp.2sg any apple*  
Take any apple.
- (11) Borí na írthe {kanénas/\*KANÉNAS}  
*can.1sg subj left.3sg n- komati.*  
It is possible that anyone/someone came.

The nonemphatic NPI is further licensed in disjunctions, with various modalities, and habitual sentences. With a few exceptions (noted in the literature), these are also licensing contexts for *any*, but the Greek NPI lacks the free choice reading that any may exhibit in some of these contexts, and it is also non-scalar (Giannakidou 1997, 1998, **2009**). In all cases above, the non-emphatic NPI is a narrow scope, non-specific existential.

(v) *No double negation:*

The multiple emphatic NPIs in Greek do not give rise to double negation (Giannakidou 2000, 2006):

- (12) KANÉNAS dhen ípe TÍPOTA.  
*n-person not said n-thing*  
Nobody said anything.  
# It is not the case that nobody said anything.

The sentence does not have a double negative reading, as we would expect under the hypothesis that the n-words are negative (e.g. *Nobody said nothing*).

The strict concord property, locality, and the absence of double negation readings, along with a number of other diagnostics employed in earlier work, lead to the conclusion that Greek emphatics are not negative quantifiers, but rather, universal quantifiers interpreted outside the scope of negation (Giannakidou 1998, 2000). The difference between emphatic and non-emphatic NPIs, then reflects the following two logical structures:

(13) *Logical representation of general negative statements*

- |  |  |
|--|--|
| a. $\forall x[P(x) \rightarrow \neg Q(x)]$ | (Universal negation, emphatic NPI)       |
| b. $\neg\exists x[P(x) \wedge Q(x)]$       | (Existential negation, non-emphatic NPI) |

The two are of course truth conditionally equivalent, but Greek appears to reflect in the intonation the difference between a 'weak' (existential) dependency and a 'strong' (quantificational) dependency, as suggested by Ladusaw 1994. Space prevents us from going into more details (see the references

cited here for that). For the purposes of our experiments it suffices to note that the negative sentence with the emphatic maps onto the universal above negation structure.

Since Giannakidou's claim, universal NPI n-words have been identified in Korean (Yoon 2008), Japanese (Yoshimura 2007), and one variety of Hungarian n-words (Suranyi 2006). These n-words, crucially, also have emphatic intonation. Puskás 1998 in particular argues for Hungarian that "This stress [i.e., the accent observed in Hungarian n- words] cannot be assimilated with the stress assigned in FP [Focus Phrase] which has strong emphatic or identificational reading. Therefore it cannot be argued that Hungarian negative phrases carry the feature [+f]" (Puskás 1998, p. 199). Szabolcsi (1981, pp. 530–532) also observes that Hungarian n-words, on a par with universal quantifiers, "may not fill the F-position". If these n-words are also universal quantifiers, the fact that the accent is not focus ties in with their semantic function as universals, and supports the argument that the morphological feature of NPI-universal relies on intonational recycling.

(vi) *Negation, intonation, and scope in Greek*

Since we are talking about emphatic NPIs scoping above negation, it is relevant to note the following generalization (Giannakidou 1998, pp. 71–73, 2000).

- (14) *The scope-negation generalization*  
In Greek, a pitch-accented quantifier takes wide scope over negation.

This is a general observation about quantifier and negation interaction. Giannakidou (2000: 480-481) offers the following examples:

- (15) I Ana dhen parakolúthise PARAPÁNO apó tría mathímata.  
*the Anna not attended.3sg more from three classes*  
Anna didn't attend more than three classes.

The English version of this sentence has two possible readings, depending on whether *more than three classes* scopes over negation or not. The first possibility is illustrated in the LF where *more than three classes* has adjoined to IP, and takes wide scope over negation. The second possibility indicates adjunction of *more than three classes* to VP, below negation.

- (16) a. [IP more than three classes<sub>1</sub> Anna didn't [VP attend t<sub>1</sub>]]  
b. [IP Anna didn't [VP more than three classes<sub>1</sub> [VP attend t<sub>1</sub>]]]

Under the *a* reading, we know that there were more than three classes from which Anna was absent, and we have no idea how many classes she actually attended. In the *b* reading, on the other hand, with negation taking wide scope, Anna attended no more than three classes, and we don't know how many classes Anna was absent from. Hence, the two readings are true under distinct circumstances.

Now, the Greek sentence, with the accented QP, has only the wide scope QP reading, whereas accent on negation *dhen* permits only the wide scope negation reading. The use of 'accent' here is a bit impressionistic, but see Baltazani 2002 for a more phonologically informed description. So, accent seems to indicate the element taking wide scope.

Given what we have seen so far, we have two hypotheses that can be tested:

- (17) Hypothesis 1: The emphatic NPI hypothesis  
The sentence with emphatic NPI will *always* be interpreted as having the logical structure of a universal above negation. Emphasis is a morphological feature.
- (18) Hypothesis 2: The scope-negation hypothesis  
In Greek, a pitch-accented quantifier takes wide scope over negation and intonation serves to disambiguate.

In the rest of our paper, we describe the experiments we set up to test these hypotheses. Our findings show that the NPI-hypothesis is borne out, but the scope-negation hypothesis is a bit less robust. The difference suggests, as expected, that emphatic intonation functions differently in the two cases. In the NPI, it becomes conventional, it marks lexical association (morphological function), whereas in the quantifiers, emphasis functions as (a relatively systemic) intonational cue for scope disambiguation.

## 2. Prosody and Quantification

Sentences like (19) can be ambiguous in two ways depending on the scope relation between negation and the quantifier:

- (19) Every woman didn't sleep.  
 a. "No woman slept" (every > not) =  $\forall x [\text{woman}(x) \rightarrow \neg \text{sleep}(x)]$   
 b. "Some woman slept" (not > every) =  $\neg \forall x [\text{woman}(x) \rightarrow \text{sleep}(x)]$

The meaning in (a) is generated if *every* is interpreted as taking wide scope over negation whereas the meaning in (b) corresponds to the case where negation scopes over the quantifier. For English, it has been observed (Jackendoff, 1972; Steedman, 1991; Buring 1997) that each interpretation corresponds to a different prosodic structure; thus intonation was associated with the disambiguation of such sentences. In Greek, Baltazani (2002) investigated experimentally the interplay between prosody and quantification by adults conducting both a production and a perception study. In the perception part, the participants listened to sentences like (20) with a prosodic focus either on the negation or on the quantifier:

- (20) Δεν έλυσαν πολλά προβλήματα (= not solved many problems)  
*neg solved.3p many problems*

The design included quantifiers like *πολλά* (=many), *λίγα* (=few) in object position within VO and OV orders. After listening to each sentence, the participants were given a table with 5 answers to choose which one corresponded better to the sentence they had just heard. In the case of (20), the 5 answers referred to *small* or *large* quantities of problems *solved* or *not solved*. The design was based on the hypothesis that sentence (20) under different interpretations refers to different quantity of solved or not solved problems. More specifically, the prediction was that, if negation is focused and takes wide scope, then (20) means «*the problems they solved are not many*», whereas, if the quantifier is focused and takes wide scope, then it means «*the problems they did not solve are not many*». The results showed that for both VO and OV orders, in the case of the upward entailing quantifiers, listeners associated wide scope with prosodic focus.

In the current study we explore how Greek-speaking children interpret emphatically realized NPIs and universal quantifiers in object position. Before describing the experiment we present previous experimental investigations on children's comprehension of sentences that contain negation and quantifiers and on children's ability of using prosodic cues in order to resolve different types of ambiguities.

### 2.1 Experimental investigations of existentially and universally quantified NPs

Musolino, Crain and Thornton (2000) tested children's comprehension of sentences that included negation and an existential or universal quantifier like (21) and (22):

- (21) Every horse didn't jump over the fence  
 (22) The detective didn't find someone/some guys

As it was mentioned above, these sentences can be ambiguous between a wide scope and a narrow scope reading. The authors tested children (3 – 7 years old) in a series of experiments using a Truth Value Judgment Task (TVJT) during which participants see a scenario involving an agent acting as the main character who performs an action with different outcomes (he may fail or succeed) upon a set of objects or a set of other characters. Then they listen to a sentence, in the case of Musolino et al., a semantically ambiguous sentence containing a quantifier and negation like (21) and (22), that comments on the action performed in the scenario. At that point the participant is asked to respond by accepting or rejecting the comment. The benefit from such design is that the responses are associated with a different scope reading for the quantifier in the sentence-comment, which was exactly what Musolino et al. (2000) were investigating. Their results suggested that children showed a preference in resolving scope ambiguities on the basis of overt syntax whereas there was not such an observation for the adults. Musolino et al. coined the term *Isomorphism* for this phenomenon and the main claim made by the authors was that "children have INCOMPLETE rather than ACCURATE knowledge of the adult grammar" (Musolino et al. 2000, p. 2).

However, a different line of research of the same phenomenon suggests that inverse scope readings are in fact available in child grammar and that children differ from the adults in terms of their response strategy to infelicitous statements (Gualmini, 2004, p.8). In a TVJT, Gualmini showed that children accommodate differently sentences with the same truth-value but with different felicity properties with respect to a scenario they saw. Musolino and Lidz (2006) tested children at the age of 5 and reached a similar conclusion by manipulating the contextual conditions in a TVJT. According to the authors, this ability was “masked” in the design of Musolino et al. (2000) due to task-effects and what, in fact, children differ in is: “[...]their command of pragmatic principles associated with the use of quantified statements is much more fragile than that of the adults” (Musolino and Lidz, 2006, p.1).

In the developmental research on NPis, Thornton (1995) used a TVJT to investigate the comprehension of the English existential *any* in relation to the negation by children in the age between 3;6 - 4;11. The results showed that by that age children can generate both  $\exists > \neg$  and  $\neg > \exists$  readings depending on the surface position of the NPI with respect to the negation. Further evidence on the acquisition of the NPis comes from O’Leary and Crain (1994) who conducted an Elicited Production task (reported in Gualmini / Musolino et al., 2000.) in order to investigate children’s (4;4 -5;4) command of the NPI *any/anything* and the Positive Polarity Items (PPIs) *some/something*. The results showed that in the case of the NPI the children exhibited adult-like awareness of the distributional constraints that govern the licensing of *any*, whereas, according to the data, this conclusion did not apply on the case of *some*.

## 2.2 Experimental investigations of the use of intonation to resolve scope ambiguities

The experimental data from recent research on children’s ability to resolve ambiguities of different types do not point to a clear conclusion. Choi and Mazuka (2003) tested 3 and 4-years old Korean-speaking children in two tasks: one involved word segmentation ambiguities and the other structural ambiguity. The results showed that children effectively used the prosodic cue on word segmentation but not on the structural ambiguity task. Similar results are reported in Snedeker & Trueswell (2001) who investigated English-speaking, 5-years-old children’s competence with respect to the disambiguation of Prepositional Phrase (PP) attachment relying on prosodic cues. The results based on off-line judgments suggested that children failed to use prosodic information to disambiguate sentences like *tap the frog with the flower* in order to distinguish between a VP-attached instrument meaning or an NP-attached modifier meaning of *with the flower*. Zhou et al. (2011) report that 4 to 5-year-old Mandarin-speaking children did not use stress in order to resolve structural ambiguities that involved the focus particle *zhiyou* “only” whereas adults did. While this result was based on off-line judgment data, Zhou et al. also used an on-line technique (eye tracking), the results of which brought evidence that children did indeed use stress.

Against this skepticism, it seems that there is experimental evidence supporting the view that children use prosodic information effectively in order to resolve different types of ambiguities. Zhou et al.’s in the same paper describe a second experiment where the data showed that children prosodic cues in order to resolve a *speech act* ambiguity in the case *wh*-phrases in Mandarin. Nakassis & Snedeker (2002) explored the degree to which children use prosodic information in the comprehension of ironic statements. Their findings suggested that during comprehension of ironic statements children were as sensitive as the adults to particular prosodic realizations of such statements when uttered within specific type of contexts that triggered non-literal interpretations. Finally, Snedeker & Yuan (2008) in a follow up of Snedeker & Trueswell (2001) investigated the relation between intonation and PP-attachment, this time using an on-line eye-recording method and found evidence that children used the prosodic cues to resolve the structural ambiguity.

## 3. THE PRESENT EXPERIMENT

In light of the above considerations the primary research question we addressed was the extent to which children associate prosodic focus on a universal quantifier or an emphatic NPI with wide scope reading. This gives the opportunity to investigate how children use prosodic cues in the interpretation of universally quantified structures in Greek and whether the wide scope reading can be attributed to a general effect of the prosodic component or alternatively whether it is a morphological feature of specific lexical items.

The experiment was designed to test children’s comprehension of sentences where an emphatically realized NPI or universal quantifier occurs in a post-negation position in the overt syntax. The

questions that arise are whether children interpret the quantified expressions as taking wide scope over negation and whether this is a general mechanism that applies both in the case of the NPIs and the universal quantifiers. For this reason we compared the emphatic NPI “KANÉNA” with the quantifier “όλα” (=all) located in a post-negation object position.

This study might also add to the discussion about children’s competence in using prosodic cues in order to resolve different types of ambiguities and their ability to access both isomorphic and non-isomorphic interpretations.

### 3.1 Participants

We tested 18 Greek-speaking children (8 boys and 10 girls) aged from 5;8 to 6;2 (mean 6) years. The children were selected from a primary school in Greece. After the studies of Thornton (1996) on NPIs and O’Leary & Crain (1994) on NPIs and PPIs, both in English, we know that children younger than 6 are competent in the production and comprehension of these lexical categories. However, our reason for testing subjects of age 6 was that the experimental task we engaged the subjects in involved competence in the use of prosodic information. That was an extra task compared to the previous studies in English. Moreover, taking into consideration the mixed results on children’s ability to use prosodic information for resolving semantic/pragmatic ambiguities, we decided to test subjects 1-2 years older than those that Thornton and O’Leary & Crain tested.

### 3.2 Procedure

We tested the subjects using a TVJT (Crain and Thornton, 1998; Musolino et al. 2000) during which the participants saw a pictorial scenario on a computer screen where an agent was performing an action upon a set of objects (4 or 5 objects) and listened to a sentence that contained an NPI or a universal quantifier. The sentence was a statement relevant to the outcome of the agent’s action and the participants were asked to accept or reject the statement. A third option of “not sure” was also available.

### 3.3 Materials

The pictorial scenario consisted of cartoon pictures and the sentences - statements were pre-recorded in order to control for uniformity regarding the prosodic realization of the utterances, since this was important for the study. The stories depicted a set of four or five objects (apples, windows, etc.) and an agent who was supposed to perform an action related to the objects. Each pictorial scenario was preceded by an introductory written text that introduced the subjects to the main character and the set of objects that appeared on the screen. It was 1 – 1,5 lines long and it was designed to be as neutral as possible by providing only the necessary context for the interpretation of the scenario. Fig. (1) shows an example of a pictorial scenario:

[introductory text]

*Mary is a cleaning lady. In the morning she opens the windows of the house she is cleaning.*

*This morning:*



Figure 1

Since this study addresses the question of whether the prosodic focus on universal quantifiers triggers a wide scope interpretation, we used sentences - statements like those in (23) - (25) that differed only in the use of an emphatic NPI or a universal quantifier in an object position.

(23) Δεν άνοιξε ΚΑΝΈΝΑ παράθυρο  
*neg opened.3s n-thing window*  
 “She didn’t open any window”

(24) Δεν άνοιξε ΌΛΑ τα παράθυρα  
*neg opened.3s ALL the windows*  
 “She didn’t open all the windows”

(25) ΔΕΝ άνοιξε όλα τα παράθυρα  
*neg opened.3s all the windows*  
 “She didn’t open all the windows”

The crucial conditions were sentences (23) and (24) that contain an emphatic NPI and an emphatically realized universal quantifier respectively. In each of these sentences, the highest peak of the sentence is aligned with the quantificational expressions. If the prosodic focus is in general associated with wide scope then we should expect that both ΚΑΝΈΝΑ and ΌΛΑ would be assigned a wide scope interpretation. The expectation about the quantifier in (25), which is not in prosodic focus, is to be interpreted under a narrow scope reading that corresponds to the overt syntax of the sentence (Musolino et al., 2000).

The motivation for using the quantificational expressions only in a post-negation position was to minimize the effect of *Isomorphism* that Musolino et al. (2000) observed under a similar design. If ΚΑΝΈΝΑ or ΌΛΑ were preceding the negative marker, the wide scope reading associated with these elements could be attributed to some extent to the surface syntactic position of these elements. By putting ΚΑΝΈΝΑ and ΌΛΑ in a post-negation position, we minimize the association between overt syntax and wide scope. Thus, limiting the effect of overt syntax, we can be more confident that the wide scope interpretation of ΚΑΝΈΝΑ or ΌΛΑ emerges through a covert movement in the LF triggered by the prosodic focus. In this case, the NPI or the universal quantifier moves covertly to a position above the negation and this movement generates the wide scope reading.

We manipulated the cartoon pictures in order to design scenarios where the sentence - statement was true under a narrow scope reading and false under a wide scope reading. We also added scenarios where the sentence was true under the wide scope and false under the narrow scope reading. The task lasted approximately 20-25 minutes and participants were presented with 30 experimental items and 15 fillers in each condition. Each participant received 6 practice trials before the main session.

### 3.4 Results

Table 1 presents the frequencies for wide, narrow scope answers as well as for “I am not sure” responses.

<i>NPIS</i>	<i>WIDE SCOPE</i>	<i>NARROW SCOPE</i>	<i>NOT SURE</i>	<i>TOTAL</i>
<i>KANENAS</i>	149	1	30	180
<i>OLA</i>	77	36	67	180
<i>óla</i>	10	139	31	180

**Table 1** Scope interpretation for NPIs

The results indicate that the children confidently associated prosodic focus with wide scope in the case of ΚΑΝΈΝΑΣ, whereas the wide scope answers were fewer for the case for ΌΛΑ. As expected, children consistently associated the neutrally realized *óla* with narrow scope under negation. The following figure illustrates this set of data in percentages.

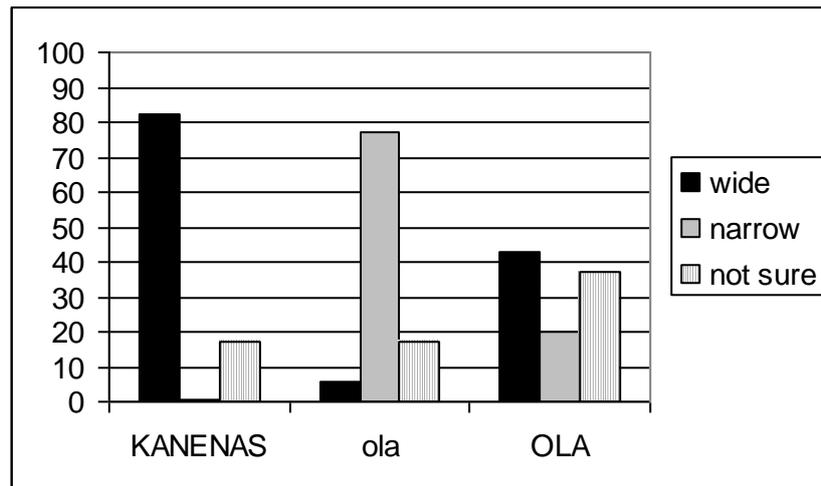


Figure 2 Scope interpretations for NPIs (%)

In order to detect whether the type of the quantifier affected the children's responses we conducted non-parametric correlation analyses, excluding all "not sure" answers. The first analysis in which we compared the responses for *KANENAS* with those for *OLA* showed that the quantifier correlated with the participants' performance ( $\chi^2=51.867$ ,  $p=.000$ , Cramer's  $V=.444$ ), in that there were significantly more wide responses for *KANENAS* than for *OLA*. Furthermore, there was a significant correlation between quantifier type and scope interpretation when the data from *OLA* and *óla* conditions were analyzed ( $\chi^2=109.338$ ,  $p=.000$ , Cramer's  $V=.646$ ). This means that *OLA* yielded significantly more wide scope responses than *óla*. Moreover, chi-square tests performed on the data from each quantifier revealed that the wide scope readings significantly outnumbered the narrow responses for both *KANENAS* ( $\chi^2=146.027$ ,  $p=.000$ ) and *OLA* ( $\chi^2=14.876$ ,  $p=.000$ ), whereas the opposite pattern was attested in the case of *óla* ( $\chi^2=111.685$ ,  $p=.000$ ).

#### 4. Conclusion

The results show that intonation did not have the same effect on an emphatic NPI and a pitch accented universal quantifier in Greek. Children showed a strong preference in associating *KANÉNA* with wide scope above negation, therefore we conclude that the emphatic NPI hypothesis is confirmed. Since intonation was not found to have a similar function in the case of *ÓΛΑ*, we assume that emphasis is not associated with wide scope over negation in general. These observations suggest that the association of emphatic intonation with wide scope is a function specific to the emphatic NPIs in Greek as part of the lexical entry. Furthermore, the subjects were sensitive to the prosodic cues conveyed by the NPI and could effectively map intonation to semantics. Interestingly, children appeared to be in position to judge when prosodic emphasis was linked to wide scope and when it was not, which perhaps shows a certain degree of competence in mapping intonation to semantics. This might be considered as evidence to the direction that children are competent users of the prosodic information when it comes to the semantic interpretation.

Concluding, the results showed that the children in the age of 6 systematically interpreted the emphatic NPI *KANÉNA* as a universal quantifier above negation. It can be argued that in the case of the emphatic NPI the association between emphasis and wide scope becomes conventional whereas for the universal quantifier *ÓΛΑ* emphatic intonation was not found to have a similar function.

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