

# Not-Or versus Neither: Logical Inferences in Child Greek

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## 1. Introduction

Adult interpretation of main clauses with simple disjunctive (OR-type) has been argued to give rise to Scalar Implicatures (SI) across languages. Thus (1) in Greek gets the meaning that ‘the boy has eaten only one of the two, i.e. either the apple or the banana’ (exclusive meaning of OR). The inclusive interpretation of OR, i.e. that ‘the boy ate both the apple and the banana’, cannot be ruled out as false at a strictly semantic level; it is however not preferred by adult speakers on the ground that the speaker who utters (1) would not have used the weaker form of the scale (i.e. OR) if she knew that the stronger form (i.e. AND) is true.

- (1) To agori            efage    to milo            i    ti banana  
The boy.NOM    eat.3PST the apple.ACC    OR the banana.ACC  
‘The boy ate the apple or the banana’.

Under negation the SI of the disjunction does not arise. However, it has long been noticed that languages differ with respect to the alternatives they assign to disjunctive elements in the scope of negation (*PPI-Disjunction Parameter*; Goro 2012, Crain 2012 based on Szabolcsi 2002, 2004). Greek appears to allow a low scope reading of simple disjunction *i* under negation, thus making the sentence in (2) ambiguous between two interpretations: the *neither*-interpretation as in (2a) and the *at least one*-interpretation in (2b) with disjunction receiving wide scope.

- (2) To agori            **den** efage    to milo            i    ti banana  
The boy.NOM    NEG eat.3PST the apple.ACC    OR    the banana.ACC  
‘The boy did not eat the apple or the banana’.  
Meaning (2a): *The boy did not eat the apple AND the boy did not eat the banana* → NEG>OR (narrow scope of OR)  
Meaning (2b): *The boy did not eat the apple OR the boy did not eat the banana (I don’t know which one)* → OR>NEG (wide scope of OR)

Thus, Greek patterns with English with respect to the interpretation of disjunction under negation in main clauses. The *neither*-interpretation conveyed

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in (2a), is unambiguously expressed by the operator NEITHER-NOR (*ute-ute*) in Greek (3).

- (3) To agori        **den** efage        **ute**            to milo            **ute**        ti banana.  
 The boy.NOM NEG eat.3PST NEITHER the apple.ACC NOR the banana.ACC  
 ‘The boy ate neither the apple nor the banana’.

The present study aims at examining the development of the interpretation children assign to disjunction *i* (OR) under negation in Greek and compare it to children’s understanding of *ute-ute* (NEITHER-NOR). Yet, the picture would be incomplete without including to our discussion the interpretation of conjunction *ke* (AND) in negated main clauses.

Similar to NEGATED-OR, conjunction under negation in Greek (4) gives rise to two interpretations: meaning (4a) is derived by the conjunction scoping over the negation (wide scope of AND) and meaning (4b) is derived when negation scopes over the conjunction (narrow scope of AND).

- (4) To agori        **den** efage        to milo            **ke**        tin banana.  
 The boy.NOM NEG eat.3PST the apple.ACC and the banana.ACC  
 ‘The boy did not eat the apple and the banana’.  
 Meaning (4a): *The boy did not eat the apple AND the boy did not eat the banana* → AND>NEG (wide scope of AND)  
 Meaning (4b): *It’s not the case that the boy ate both the apple and the banana (I don’t know which one)* → NEG>AND (narrow scope of AND)

We consequently focus on the development of NEGATED-OR in Greek and its comparison to comparable interpretations, namely NEGATED-AND and NEITHER-NOR, looking into potential differences, similarities and interdependencies in their developmental paths. Prior to presenting the details of our experiment (section 3) and our findings (section 4), we will discuss some theoretical and empirical considerations concerning the crosslinguistic picture and the interpretation of NEGATED-OR and NEGATED-AND in adult and child language (section 2).

## 2. Empirical and theoretical considerations

The interpretation of the disjunction and conjunction under negation has not been considered universally unvarying. Languages have been reported to differ regarding the availability of narrow scope disjunction reading in negated disjunction and regarding their ‘natural’ preference for one of the two readings (Szabolcsi 2002, 2004, Goro 2007, Nicolae 2016 i.a.). Accordingly, languages have been clustered in two major sets: a) languages which allow both readings and show a preference for the *neither*-interpretation, and b) languages which only allow the *at-least-one*-reading as in (2b). The first set of languages (characterized as *non-PPI* languages) include English, Romanian, Korean and Greek (as argued in section 2.1), while the second set of languages (characterized as *PPI* languages) include Hungarian, Japanese, Russian, Italian and French.

Lungu et al. 2021 provide experimental evidence which casts doubts on a two-way distinction between PPI and non-PPI languages, suggesting instead that different languages and constructions differ to the degree that a disjunctive element is treated as a PPI or not. In addition, they highlight independent factors that may crucially play a role in the preferred interpretation: most notably the intonation pattern. The role of prosody on negated disjunction in French is discussed in detail by Larralde et. al. (2021) who provide evidence that broad focus makes the NEG>OR interpretation acceptable in French.

## 2.1. Greek as a non-PPI language

Greek has been categorized as a non-PPI language based on the observation that both interpretations in (2) are available for adult speakers. However, in accordance with Lungu et. al. (2021) observations, we expect the speakers to exhibit variable behavior depending on a number of factors, including prosodic cues and context. In Greek, the default pattern for negated declaratives, i.e. when the negated declarative provides *all-new* information, is associated with focus on the negative particle *den* ‘not’ and deaccenting the rest of the sentence ending in a downstepped high tone (L-!H%) or a low boundary tone (L-L%) as in positive declaratives (Baltazani 2002, Arvaniti & Baltazani 2005). Our intuition is that this intonation pattern favors the *neither*-interpretation (NEG>OR) as shown in (5).

- (5) a. Ti egine? ‘What happened?’  
 b. O Nikos [DEN]<sub>F</sub> efage to milo i ti banana.  
 Nick NEG eat the apple OR the banana.  
 ~ Nick ate neither the apple nor the banana.

By contrast in (6), in which the negation is *given* and the stress falls on the last word, the most salient interpretation is the one in which the entire disjunction is focused, deriving the wide scope interpretation that ‘Nick did not eat one of the two fruits’. The wide scope interpretation becomes clearer in (7) with overt focus fronting of the disjunctive-phrase, yielding an unambiguous OR>NEG interpretation.<sup>1</sup>

- (6) a. Ti den efage o Nikos? ‘What is it that Nick didn’t eat?’  
 b. O Nikos den efage [to milo i ti BANANA]<sub>F</sub>.  
 Nick NEG eat the apple OR the banana.  
 ~ It’s the apple or the banana that Nick didn’t eat.  
 (7) a. Ti den efage o Nikos? ‘What is it that Nick didn’t eat?’  
 b. [to milo i ti BANANA]<sub>F</sub> den efage o Nikos.  
 ~ It’s the apple or the banana that Nick didn’t eat.

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<sup>1</sup> Focus movement does not always result in scope resolution. This largely depends on the quantificational elements involved (Baltazani 2002, Oikonomou et. al. 2020).

This correlation between focus and the derived interpretation is familiar in that the focused element takes wide scope over the deaccented operator (see Larralde et. al. 2021). Notice, however, that in the case of simple conjunction in Greek the default interpretation is always a *neither*-interpretation, i.e. the conjunction takes scope over negation. A sentence like (8) with default negative intonation is interpreted as ‘Nick ate neither of the two’. A given negative context in which the conjunction is focused as in (9), also gives rise to the *neither*-interpretation with an additional potential inference that Nick might have eaten something else of the contextual alternatives.

- (8) a. *Ti egine?* ‘What happened?’  
 b. O Nikos [DEN]<sub>F</sub> *efage to milo ke ti banana.*  
 Nick NEG ate the apple AND the banana  
 ↷ Nick ate neither of the two.
- (9) a. *Ti den efage o Nikos?* ‘What didn’t Nick eat?’  
 b. O Nikos den *efage [to milo ke ti BANANA]<sub>F</sub>.*  
 Nick NEG ate the apple AND the banana  
 ↷ It’s the apple and the banana that Nick didn’t eat.

The NEG>AND interpretation becomes salient only when there is focal stress on the conjunctive operator *ke* (AND). In this case, there are two intonational phrases: [*o Nikos DEN efage*] with focal stress on the negation followed by a phrasal/boundary tone and the conjunction [*to milo KE ti banana*] with focal stress on the operator *ke* (AND).<sup>2</sup> This most naturally occurs in a corrective context in which Speaker A assumes that ‘Nick ate both the apple and the banana’ and Speaker B wants to correct him, which is characteristic of metalinguistic negation.

- (10) A: O Nikos *telika efage to milo ke ti banana!*  
 ‘Nick finally ate the apple and the banana!’  
 B: [O Nikos DEN *efage*] [*to milo KE ti banana*]<sub>F</sub>. *Efage mono to milo/ti banana.*  
 Nick NEG ate the apple AND the banana. Ate only the apple/the banana  
 ↷ Nick didn’t eat both. He ate only of them.

Different explanations have been offered as to why the NEG>AND interpretation is either unavailable or marked in many languages. Notley et. al. (2016) and Pagliarini et. al. (2021) suggest that in disjunction-PPI languages, conjunction also behaves like a PPI element. However, Szabolcsi & Haddican (2004) who discuss the correlation between disjunction and conjunction crosslinguistically, argue that the apparent wide scope behavior of conjunction in certain languages is not due to conjunction behaving as a PPI but rather it is due

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<sup>2</sup> A similar effect is reported for English by Szabolcsi & Haddican (2004) and further elaborated in Gajić (2019) for English, suggesting that the AND>NEG arises only when the conjunctive AND is focused. It remains open if the PPI-hood we notice for Greek *ke* is derivable by the implicature mechanism suggested for English by Gajić (2019).

to the plurality semantics of definite conjunctions. Most importantly, Szabolcsi & Haddican show that there are disjunction non-PPI languages in which negated conjunction gives rise to a natural *neither*-interpretation. We consider Greek to be such a case: in Greek the disjunction is not a PPI element but conjunction is most naturally interpreted as taking scope above negation (i.e. PPI-like).

Crucially, the complex conjunction operator in Greek *ke-ke* (similar to BOTHAND) is most naturally interpreted in the scope of negation. This is exemplified by the contrast between (11a) and (11b). In (11b), *ke-ke* is naturally interpreted as ‘*not-both but possibly one of the two*’ unlike simple conjunction in (11a) which is interpreted as *neither*.

- (11) Ti eagine? Giati nevrasiēs? ‘What happened? Why are you upset?’
- a. Kanis **den** elise to provlima 1 **ke** to provlima 3.  
 Nobody NEG solved the problem 1 AND the problem 3  
 ∼ Nobody solved either of the two problems. Everybody failed in both.
  - b. Kanis **den** elise **ke** to provlima 1 **ke** to provlima 3.  
 Nobody NEG solved AND the problem 1 AND the problem 3  
 ∼ Nobody solved both of the two problems. Some might have solved one of the two.

The difference between the two might have to do with the fact that complex conjunction in Greek *ke-ke*, unlike simple conjunction *ke*, is necessarily focal, i.e. both operators in (11b) have focal stress. In this sense, the observations in Szabolcsi & Haddican (2004) and Gajić (2019) seem to be confirmed for Greek.<sup>3</sup>

Finally, *ute-ute* (NEITHER–NOR) in Greek as in (3) unambiguously expresses a *neither*-interpretation, irrespectively of the sentence intonation pattern. Following Lechner (2000), Wurmbrand (2008) we consider *ute-ute*-constructions in Greek to be decomposable into a conjunction of two negations, thus obligatorily giving rise to the *neither*-interpretation. Note that *ute-ute* is negative concord, requiring to be c-commanded by negation when it appears post verbally (Barouni 2018 a.o.) similarly to what is described for Italian (Pagliarini et al. 2018).

In conclusion, all three constructions under discussion favor the *neither*-interpretation. For NEITHER-NOR this is the only interpretation, for NEGATED-AND a very marked intonation pattern is required to derive the less favored *not both but maybe one of the two* interpretation and for NEGATED-OR the derived interpretation depends on the placement of focus.

## 2.2. Developmental studies on negated disjunction and conjunction

Early studies have argued that young children consistently assign a *neither*-interpretation of OR under the scope of negation (Crain et al. 2002, Goro & Akiba

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<sup>3</sup> Note that Notley et. al (2016) take both simple and complex conjunction in English to be PPIs. However, in their study the target sentences involved complex conjunction (BOTHAND) and it remains unclear whether the two types of conjunction behave differently as they do in Greek. Further experimental testing is necessary in both languages.

2004, Gualmini & Crain 2005, Verbuk 2006, Notley et al. 2012 i.a.). This finding is evident independently of the adult grammar-type. Hence, children acquiring a PPI language like Japanese (Goro & Akiba 2004, Goro 2004, Notley et al. 2012, Shimida 2014), Mandarin Chinese (Crain 2012) or Turkish (Geçkin et al. 2017) assign narrow scope interpretation to negated disjunction, similarly to children who acquire a non-PPI language like English (Crain et al. 2002, Gualmini & Crain 2004, Notley et al. 2012) and German (Geçkin et al. 2017). This has been attributed to the *Semantic Subset Principle* (SSP) according to which children tend to adopt the scope interpretation that makes a scopally ambiguous sentence true in the narrowest range of circumstances (see Crain et al. 1994).

More recent advances on the topic on Italian, French and Catalan confirm previous findings in some respects. Pagliarini et al. (2018) investigated the interpretation assigned to negative sentences with disjunction and conjunction in adult and child Italian. Italian being a Negative Concord language offers an interesting case for investigation compared to other PPI languages that have been previously studied. The researchers ran three experiments (adopting the Uncertainty Mode of Truth Value Judgement Task; Goro & Akiba 2004 and Goro 2007), testing the interpretation of disjunction and conjunction under negation (12)-(13) and the interpretation of NEITHER-NOR (*né- né*) in Italian (14).

- (12) Il gatto **non** ha mangiato la carota **o** il peperone.  
 ‘The cat didn’t eat the carrot or the pepper’.
- (13) Il topo **non** ha mangiato la carota **e** il peperone.  
 ‘The mouse didn’t eat the carrot and the pepper’.
- (14) Il gatto **non** ha mangiato **né** la carota **né** il peperone.  
 The cat not had eaten not the carrot not the pepper.  
 ‘The cat ate neither the carrot nor the pepper’

With respect to disjunction under negation, the study revealed that some children differed from adults. Adults interpreted disjunction as taking scope over negation (wide scope of OR), whereas children were divided into two groups: one group interpreted disjunction as taking scope over negation as adults did and another group interpreted negation as taking scope over disjunction.

Regarding the interpretation of conjunction under negation, their findings showed that Italian-speaking children and adults assign the same interpretation to negative sentences with conjunction (wide scope of conjunction), confirming previous work from other PPI-languages, namely, Japanese, Mandarin Chinese (Goro 2007, Goro & Akiba 2004) and Turkish (Geçkin et al. 2017). Children also performed adult-like in the *né- né* condition according to the authors by assigning the *neither*-interpretation at a rate of 87.5%.

Guasti et. a. (2021) partially replicated the previous study with French-speaking children. The researchers investigated the interpretation of negated disjunction as in (15) and the interpretation of NEITHER-NOR (*ni-ni*) in French as in (16).

- (15) Marie (n') a **pas** mangé la pomme **ou** la banane.  
 Marie (NEG) has **NEG** eaten the apple **OR** the banana  
 'Marie didn't eat the apple or the banana.'
- (16) Marie (n') a mangé **ni** la pomme **ni** la banane.  
 Marie (NEG) has eaten **NOR** the apple **NOR** the banana  
 'Marie has eaten neither the apple nor the banana.'

French children assigned a *neither*-interpretation approximately at a rate of 78%. With respect to the interpretation of *ni-ni*, children correctly accepted (88%) the *neither*-interpretation when both conjuncts were false and correctly rejected (77%) the *at-least-one* interpretation when one conjunct was true. Thus, French-speaking children behave as Mandarin and Japanese-speaking children and unlike Italian-speaking children.

Guasti et al. (2021) attribute the difference between the two languages to their differences in the properties of negation. French is similar to Italian in that OR is a PPI element and it is also a non-strict negative concord language. However, the interaction of NEITHER-NOR with negation is different in the two languages. In Italian postverbal recursive *né- né* is obligatorily c-commanded by negation as shown in (14) whereas in French the neg-clitic *ne* is optional with the recursive *ni-ni* as shown in (16). Thus, NEITHER-NOR and negated disjunction in Italian, unlike in French, form a minimal pair with different scope properties. On the basis of this minimal pair in Italian, children block the NEG>OR reading and reset the disjunction parameter earlier than in French in which NEITHER-NOR and negated disjunction do not obviously constitute a minimal pair.

To further test this hypothesis, Pagliarini et al. (2021) tested the development of negated disjunction in Catalan, which shares the same properties with Italian (Catalan is also a PPI-language with the same type of negative concord as in Italian). The study doesn't provide conclusive evidence, since Catalan-speaking children perform midway between Italian- and Japanese-speaking children.

A question arising for Greek, a non-PPI language, is whether the presence of NEITHER-NOR which behaves like its Italian counterpart could mislead children to wrongly treat Greek disjunction as a PPI (assuming that the two constraints, subset and blocking, work in different directions).

### 3. The study

Given the discussion regarding the typological differences and the previous findings from developmental studies across languages, our research questions can be formulated as follows: **a)** Is the development of NEGOR in Greek similar to that in other languages?, **b)** Is the development of NEGOR comparable to NEITHER-NOR and to NEGAND in Greek or is it the case that the unambiguous *ute-ute* (NEITHER-NOR) emerge earlier than its ambiguous counterparts NEGOR and NEGAND?, **c)** Is there a correlation on the development of the three constructions?, and finally, **d)** To what extent do children and adults rely on intonation for their interpretation of NEGOR / NEGAND?

We evaluate Greek to be a non-PPI language with respect to disjunction and to behave as a PPI language with respect to conjunction. We therefore predict that adults will most naturally interpret NEG<sub>OR</sub> as NEG>OR and NEG<sub>AND</sub> as AND>NEG in the specific intonation pattern. Children are expected to follow the adult pattern with respect to NEG<sub>OR</sub> (evident in all non-PPI and PPI languages) and also favor the *neither*-meaning as the strongest available interpretation in the NEG<sub>AND</sub> condition. Lastly, we expect children to perform better on the unambiguous NEITHER-NOR compared to both NEG<sub>OR</sub> and NEG<sub>AND</sub>.

### 3.1. Methodology and Procedure

The task involved picture matching to a sentence uttered in ‘guessing mode’ by Pepa (Fig.1 - Fig.4). Children were told that Pepa cannot see the pictures but she would like to guess one of the pictures. Children would invite Pepa to pop up and take a guess and children were asked to point at the picture that Pepa uttered.

The verbs used for each condition were: *kratai* (hold), *haidevi* (pet), *taizi* (feed), *travai* (pull). The experimental material included six conditions in total (including COMPLEX-OR and COMPLEX-AND which is not part of our discussion), 4 items/condition, ten fillers and three practice items, prior to actual testing. The experimenter made sure that the child is familiar with the characters and the animals used. All items were recorded and counterbalanced with respect to the order of the conditions, the order of the correct/target answer and the order of the distractors. The duration of the study was approximately 20 minutes. Children were rewarded with stickers every after 3 trials regardless of their performance.

### 3.2. Participants

The participants were 26 Greek monolingual native speakers (privately recruited), aged 3;3 to 8;0 and they were divided into two groups. Group1 (N=16) includes nine girls and seven boys, aged 3-5+ years old (mean age 4;6) and Group2 (N=10) included five girls and five boys, aged 6-8+ years old (mean age 6;9). The study was also tested on a control group of 20 Greek monolingual adults (eight females and 12 males; mean age 30).

### 3.3. Conditions

Examples (17)-(20) and Fig.1-Fig.4 are representative of the experimental material on conditions NOT<sub>AND</sub>, NOT<sub>OR</sub>, NEITHER-NOR and CONTROL-NEG.

- |  |                    |
|--|--------------------|
| (17) O babas <b>den</b> xaidevi to provataki <b>ke</b> tin ageladitsa<br>‘The father is not petting the sheep and the cow’.            | <i>NOTAND</i>      |
| (18) To agori <b>den</b> taizi ti gata <b>i</b> to skilo<br>‘The boy is not feeding the cat or the dog’.                               | <i>NOTOR</i>       |
| (19) O babas <b>den</b> travai <b>ute</b> ti varka <b>ute</b> to podilato<br>‘The father is pulling neither the boat nor the bicycle’. | <i>NEITHER-NOR</i> |
| (20) To arkudaki <b>den</b> kratai to keik<br>‘The bear is not holding a piece of cake’.   | <i>CONTROLNEG</i>  |

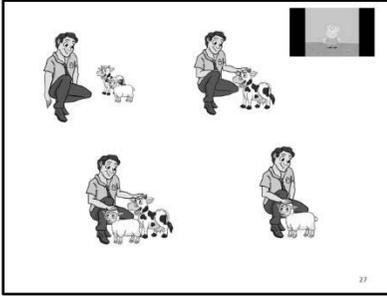


Figure 1: testing *NOTAND*

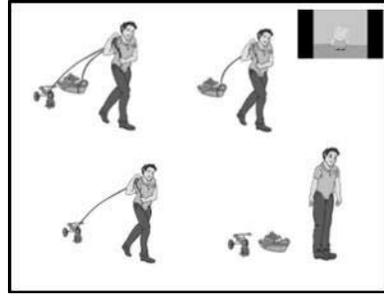


Figure 3: testing *NEITHER-NOR*

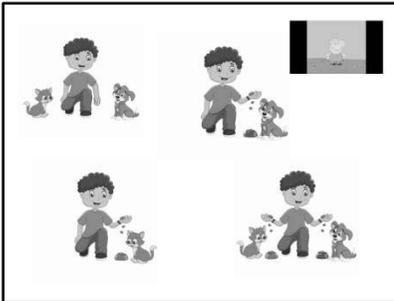


Figure 2: testing *NOTOR*

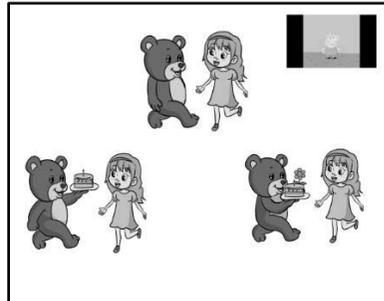


Figure 4: testing *CONTROLNEG*

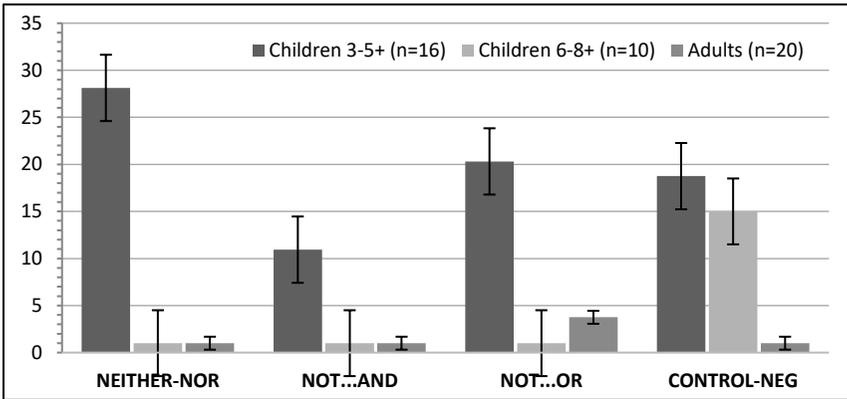
In conditions *NOTAND* and *NOTOR* in which the intonation may change the meaning as discussed in section 2, we controlled for the default intonation across all conditions (i.e. no emphasis on *OR* or on *AND*). Moreover, all Conjunctions/Disjunct Objects were Definite NPs strengthening the exclusive meaning on *OR* (see Tsakali 2021). Table (1) depicts the types of distractors on each condition which is important in view of the discussion regarding the types of the mistakes children made.

Table (1): Types of distractors on *NEITHER-NOR*, *NOT-OR* and *NOT-AND*

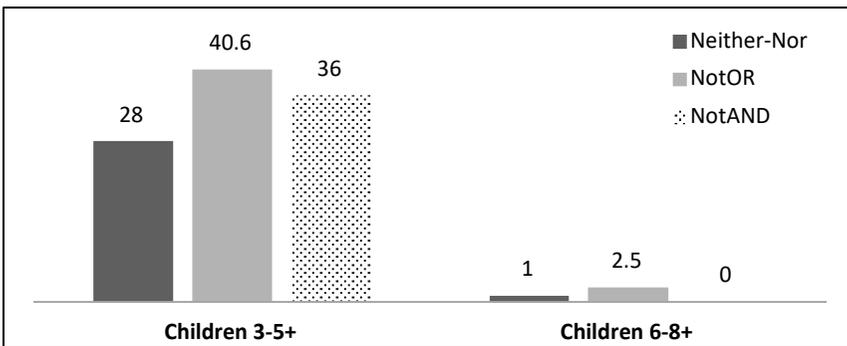
	Adult response	Distractors		
		Type-A	Type-B	Type-C
<b>NEITHER-NOR</b>	None of the objects	Only the first object	Only the second object	Both objects
<b>NOTOR</b>	Narrow scope of <i>OR</i>	Wide scope of <i>OR</i>	Wide scope of <i>OR</i>	Incorrect
	None of the objects	Only the first object	Only the second object	Both objects
<b>NOTAND</b>	Wide scope of <i>AND</i>	Narrow scope of <i>AND</i>	Narrow scope of <i>AND</i>	Incorrect
	None of the objects	Only the first object	Only the second object	Both objects

**4. Results & Discussion**

Figure (5) summarizes children’s and adults’ error performance across conditions. More specifically, Fig.5 depicts the unquestionable errors, that is responses of Type-A, Type-B and Type-C for the NEITHER-NOR condition and Type-C for the NOT-OR and NOT-AND conditions according to Table (1). However, given that Type-A and Type-B responses on NOTOR and NOTAND conditions (that is, preference for wide and narrow scope respectively) could not be considered adult-like under the intonation pattern used in our experiment, Fig.5 should be contrasted to Fig.6, which includes all non-adult responses.



**Figure 5: % of errors across conditions for all groups**



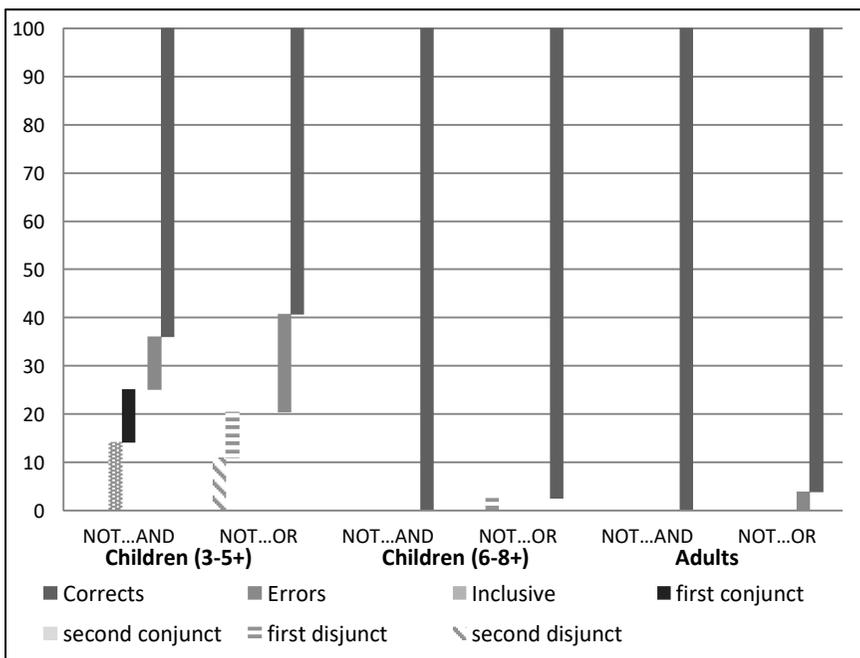
**Figure 6: % of all non-adult responses across child groups**

One Way Anova statistical analysis was used for interpreting the results. Post hoc analysis on multiple comparisons (*t-test*; Bonferroni criterion) revealed that as far as errors in Fig. 5 are concerned, younger children (3-5+) produce significantly more errors ( $p=.002$ ) on the unambiguous NEITHER-NOR condition compared to older children (6-8+). The error rate of NOTOR in Fig.5 is also significant ( $p=.026$ ) between the two child groups, while no significant difference

was found on the errors produced on the NOTAND condition between younger and older children. Moreover, no significant difference was spotted regarding the errors across conditions within the same age group.

In contrast, children's errors in Fig.6 includes all the non-adult responses (i.e. all not *neither*-interpretations); thus, NEITHER-NOR percentages remain unaffected and they increase for NOTOR and NOTAND. Still in Fig.6 no significance was found among the three conditions within the same group, while the comparison between the two age groups show a significance for each of the three conditions (also evident on the adult-like *neither*-interpretations in Fig.8).

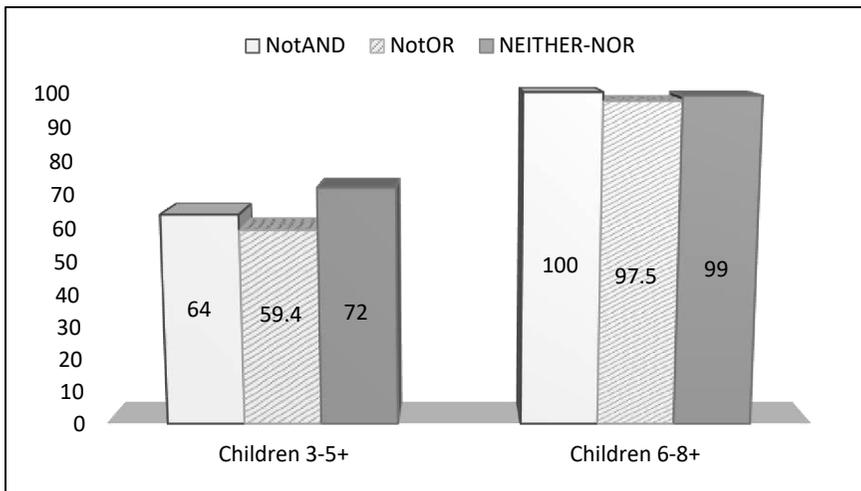
Fig.7 depicts in detail the errors and the preferred interpretation on each of the three conditions across all groups. The preference rate for the *neither*-interpretation on NOTOR is significantly higher ( $p < 0.01$ ) than the *at-least-one* interpretation for both adults and the two child groups, confirming previous findings from unrelated languages (Gualmini et al. 2000, Goro & Akiba 2004, Verbuk 2006, Crain 2008, 2012, Notley 2011, Geçkin et al. 2017 i.a.). Note that no pattern was detected for any of the disjuncts/conjuncts in the *at-least one* interpretation.



**Figure 7: Various interpretations of NOT-AND & NOTOR across groups**

The *neither*-interpretation on NEITHER-NOR, NOTAND and NOTOR seems to develop simultaneously and there is an age effect on the development of each of the three conditions (Fig. 8). Moreover, the statistical analysis revealed a

correlation among the three conditions, that is, between NOTAND and NEITHER-NOR, NOTOR and NEITHER-NOR and NOTAND and NOTOR.



**Figure 8: Neither-Interpretation on NOT-AND, NOT-OR & NEITHER-NOR**

Importantly the error rate on the NEITHER-NOR condition (28%) in our study is comparable to that in French (Guasti et al. 2021) but it seems quite higher than the percentage in child Italian (12.5%) (Pagliarini et al. 2018). This is to some extent surprising given that NEITHER-NOR in Greek exhibits the same negative concord behavior as Italian. However, it is not unexpected if we consider that children at the same age exhibit an error rate of 22% on simple conjunctive element (AND) (Tsakali & Mastrokosta, to appear) using the same methodology and up to 30% errors in Tsakali (2021) using an act out task. It is therefore assumed that children's mistakes on NOTAND follow from their incomplete development of AND.

Regarding the extent to which adults and children rely on the intonational properties to assign the relevant meaning, our study offers some evidence but not conclusive. Thus, we do observe adults and older children (and a significant number of young children as well) to consistently prefer the *neither*-interpretation under the tested intonation. However, in order to corroborate this claim, further testing on the same sentences marked with a prosodic pattern favoring the wide scope of disjunction over negation (i.e. focus on the disjunctive phrase) is needed. With respect to the older group of children which behaves adult-like, we can think of two possible explanations: a) they favor the subset reading as indicated by previous studies in non-PPI languages, or b) they have acquired both scope interpretations and they are able to rely on prosodic cues in a similar to adult fashion as suggested by Sugawara et al. (2018) for children's scope disambiguation via intonation on independent phenomena. Further experimental testing is necessary to evaluate the different hypotheses.

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