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Number and Case in the comprehension of relative clauses: Evidence from Italian and Greek

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1. Introduction

Relative clauses have been extensively studied from several perspectives. Cross-linguistic research findings indicate a relatively consistent pattern of performance since they show that subject relatives are significantly easier to acquire and process than object relatives (Frauenfelder, Segui & Mehler 1980; King & Kutas 1995; Schriefers, Friederici & Kuehn 1995, among others). These findings have been interpreted in terms of the length of the dependencies required for subject and object relatives. As shown in the example below, the filler gap dependency in subject relatives is shorter than in object ones:

(1) a. The woman [who/that t is kissing the man] SUBJECT RC

b. The woman [who/that the man is kissing t] OBJECT RC

On the assumption that shorter dependencies are less demanding in processing (and are more economical in grammar, Chomsky, 1995) than longer dependencies, the parser is predicted to opt for the shorter dependency and thus to prefer subject relatives over the object ones in the first-pass parse. This preference is well known in the processing literature as the Minimal Chain Principle (MCP, De Vincenzi 1991) or the Active Filler hypothesis (Frazier and D'Arcais, 1989; Frazier & Clifton 1989). Thus, the parser should always start with a subject relative clause analysis, which is nevertheless abandoned when analysis of an object relative clause is required. In other words, the subject relative clause interpretation is the preferred interpretation and the object relative clause interpretation is obtained through reanalysis, which requires

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additional time. A fundamental question of the way sentence processing takes place concerns the use of possible cues that contribute to the successful reanalysis of object relative clauses. In Fodor and Inoue (2000) Diagnosis model, reanalysis is easy whenever the information delivered at the disambiguating point clearly indicates which is the error accomplished in the first-pass parse and how to repair it. Whilst for adults this reanalysis is expected to be more or less easy, for children its impact is more dramatic in that reanalysis is performed or not depending on the nature of the informativeness of disambiguating cue. Thus, it may be possible that certain types of object relatives are more difficult to comprehend than other types and that different types of object relatives are acquired at different points of development. What is at a stake is not whether children form relative clauses as adults do (through recursion and wh-movement or head movement), as we believe that there is no difference at this level. Differences exist in the readiness of performing reanalysis, which in turn depends on the informativeness of the disambiguating cues. Following this line of reasoning, acquisition data that show developmental delay in the comprehension of object relatives can be interpreted in terms of difficulty during the diagnoses process that leads to reanalysis. Within this analysis it is expected that language-specific cues, which contribute to disambiguation, have an effect on children's acquisition of the various types of object relative clauses. Furthermore, it is expected that cross-linguistic variation in the acquisition of object relative clauses are significantly determined by the informativeness of the disambiguating cue. As for adults, this view is strongly supported by current research findings. In particular, the processing of subject-verb ambiguities in German (Meng & Bader, 2000) indicated that recovery from a garden path is easier when disambiguation is obtained through case information than through number agreement morphology. What the findings by Meng & Bader show is the differential effects of number and case on successful resolution of a temporary ambiguity. In a similar vein, Arosio, Adani and Guasti (2007) showed that Italian children's comprehension of object relative clauses is modulated by different disambiguating cues. In (2a) we have an example of a subject relative in Italian, while in (2b) and (2c), we have object relatives disambiguated respectively by the position of the embedded subject or by number agreement on the embedded verb.

(2) a. Fammi vedere l'uomo che saluta le signore
'Show me the man that is greeting the ladies'

b. Fammi vedere l'uomo che la signora saluta
'Show me the man that the lady is greeting'

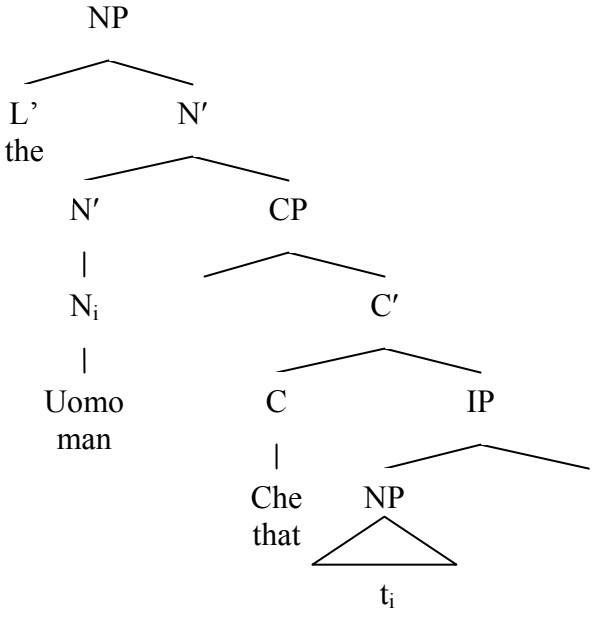
c. Fammi vedere l'uomo che salutano le signore
'Show me the man that are greeting the ladies'
'Show me the man that the ladies are greeting'

Although the disambiguating information for (2b) and (2c) is found at the same position, just after the complementizer (that), comprehension of these two types of object relatives yielded different results. Typically Developing (TD) Italian speaking children from 5 to 11 years were better at comprehending subject (2a) than object relative clauses (2b,c), but had particular difficulties with the object relative in (2c): while at age 5 comprehension of (2b) was around 70%, comprehension of (2c) was around 25% and it was not until age 11 that the comprehension of (2c) reached adult

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levels. In the framework assumed here this means that whilst disambiguation by syntactic position resolved garden path effects successfully, disambiguation by number agreement on the verb did not until age 11. Let us consider this asymmetry more closely within Fodor and Inoue's Diagnosis model. Assume that the parser works incrementally so that NPs are immediately assigned a grammatical function. Furthermore, when a mismatch (or an error) is encountered that contrasts with the preferred analysis, the parser's action consists in a series of steps, each of which involves the correction of an illegal grammatical function. The initial portion of the three relative clauses in (2) is similar: after the complementizer (that) has been encountered a trace is postulated in Spec IP and the grammatical function Subject is assigned to the chain including the head of the relative clause and the trace, as illustrated in (3).

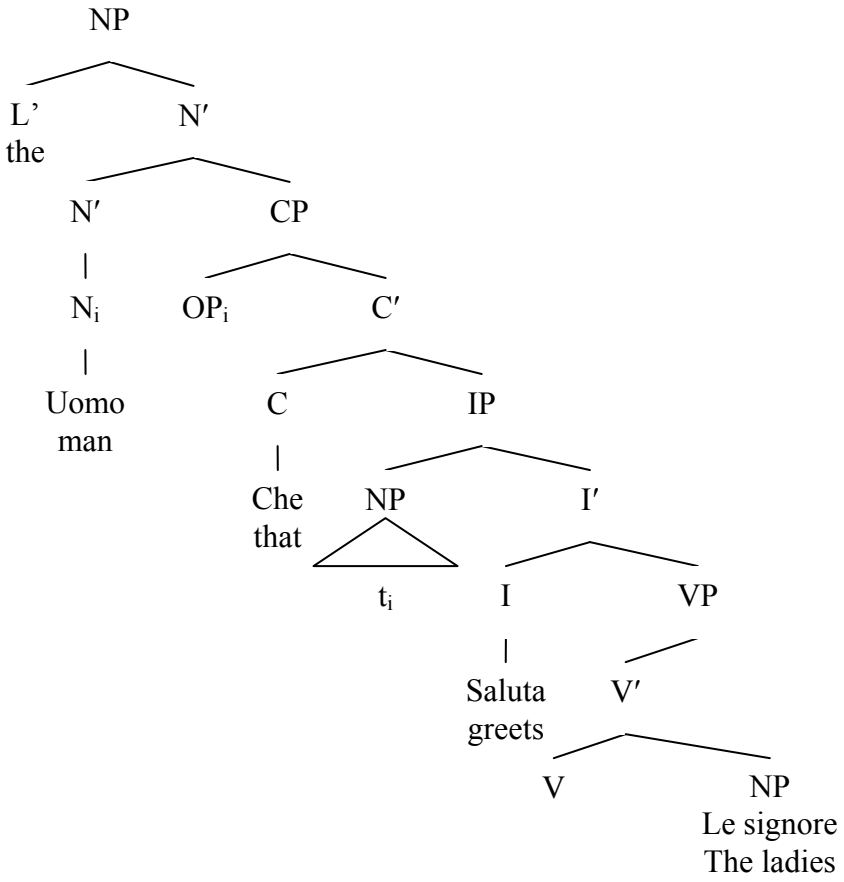
(3)



For the sentence (2a), the whole representation would be as in (4) and the postverbal NP "le signore" would be assigned the grammatical function object.

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(4)



In (2b) and (2c), the plan initiated in (3) goes wrong, when the disambiguating portion of the clause, that is the preverbal subject or the inflected verb, is encountered. Although these two distinct pieces of information arrive at the same point, i.e., after the complementizer, Arosio et al.'s data suggest that the position of the embedded subject is more effective at an earlier point of development than number agreement on the embedded verb. This is because the former directly informs the parser about the solution (it is a positive symptom), while the latter does not, according to Fodor and Inoue, and this affects the process of reanalysis. Let us see why. When the preverbal subject is encountered, the subject trace in Spec IP has to be ousted, so that the NP subject could be put in that position. The subject function must be removed from the chain (head of the relative – t) and linked to the new NP. Thus, the error is remedied and a reanalysis is easily performed: there was a subject and now there is a new subject and the only remaining thing to do is to look for a new gap or trace to associate to the relative head. Things are more complex for (2c). The number on the verb disagrees with the chain (head of the relative – t) that is assigned the grammatical function subject; this means that the trace and the head of the relative must be decoindexed. This eliminates the original error, but leaves the head of the relative in need of a trace and the trace in subject position in need of a licenser.1 In addition, the

[1] We conjecture that if the verb would be a second or first person verb, like in (i), reanalysis would be easier. The trace could be changed into a null referential subject pro and it would be immediately obvious who the referent of the null subject would be would be (the hearer or the speaker)

fammi vedere l'uomo che stai/sto salutando
show me the man that (you/I) are/am greeting

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verb argument structure specifies that two arguments are needed, but it is not clear to whom they can be assigned. The subject trace could retain its grammatical function, but it would remain unlicensed. Given that Italian is a null subject language, the parser could postulate a referential pro subject in Spec IP (ousting the trace). This pro would be licensed by agreement on the verb. At this point, it could look for a trace for the head of the relative and the only position available would be the object position. This move would be in line with the MCP (De Vincenzi, 1991). Only one chain between the head of the relative and the trace in object position is built. For the subject no chain is necessary. It is also in line with the assumption of the Diagnosis model: one grammatical function was assigned and it is assigned again; in fact, even the second grammatical function is assigned. The mismatch is solved and a formally legitimate representation (at least up to verb) is built. However, the pro subject fails to be identified, as no antecedent is provided. In addition, when the postverbal NP is encountered a new reanalysis would have to be attempted. It is likely that all this work exceeds children's computational capacities and therefore object relative clauses disambiguated by number agreement are particularly taxing. The right move would be to posit and expletive pro in Spec IP and wait for a postverbal subject; posit a trace in object position and connect it to the head of the relative. In this way two chains are built: pro-NP (expletive pro and postverbal subject) and the chain including the head of the relative and its trace, resulting in a maximal violation of the MCP. Doing this kind of reanalysis seems already hard for adults, as proven by Penolazzi et al. (2005) based on Italian Wh-questions and by Meng & Bader, based on German Wh-questions. It would be no surprise if such kind of reanalysis is beyond the capacities of Italian children at a certain age. Fodor and Inoue call number agreement a negative symptom: number on the verb informs the parser that something went wrong, but does not inform it how the tree has to be reconstructed, i.e. how to reanalyze the sentence. In fact, as we have seen in the case of Italian, more than one option is indeed open. In addition, after the error has been corrected, it leaves two grammatical relations unlinked and two chains (the one headed by the relative head and the one including the subject trace) open and this may require resources that children at certain age do not have.

At first sight, this explanation of the difficulties experienced by Italian children with object relatives does not seem to hold for Greek. Stavrakaki (2001) found that TD Greek speaking children between 3;4 and 5;0 comprehend right branching object relative clauses like in (2c) as well as subject relative clauses (75% correct comprehension) (see also Stavrakaki, 2002 and Stathopoulou, 2007 for production). All these findings are in line with those reported by Varlokosta (1997) who found that Greek children opt for a movement strategy to form object and subject relatives.

A possible interpretation of the difference in the acquisition of relative clauses by Greek and Italian children is related to the specific grammatical characteristics of Greek and Italian. Usually NPs in Greek carry case information and case provides disambiguating information in relative clauses. This is not so in Italian, where NPs are not overtly marked for case. Consequently, whilst the subject relative clauses analysis in both Italian and Greek is a default choice due to the minimal chain principle (De Vincenzi 1991), the interpretation of object relatives requires reanalysis of the default

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The subject function would be linked to the null subject, i.e., one grammatical function would be corrected. Then, the head of the relative would be connected to a trace in object position. We also predict that reanalysis would be easier, if a context for a third person subject would be provided before the relative clause in (2c). In this case, the trace could be changed into a null referential subject identified by an antecedent in the previous discourse.

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subject interpretation and thus becomes highly dependent on the nature of cues involved in the ambiguity resolution.

While the hypothesis of the cue effect on the interpretation of relative clauses by Italian and Greek is quite plausible, a direct comparison between the available Greek and Italian data cannot be offered, as methods and experimental materials were different. The present study is a direct test of this hypothesis, as it offers a comparative investigation of the acquisition of relative clauses by monolingual Greek and Italian children. More specifically, this study addresses the question of the cross-linguistic differences in the acquisition of Greek and Italian relatives by systematically investigating the effect of factors that can possibly affect children's comprehension of relative clauses. In particular, we aim at evaluating the effect of (i) number agreement morphology, (ii) overt morphological case marking on Greek on NPs and (iii) syntactic position of the embedded subject. It includes two experiments. In the first one, we investigate Greek and Italian children's comprehension of subject and object relatives disambiguated by number agreement on the verb or by syntactic position of the embedded subject (plus number agreement). In the second one, we compare Greek children's comprehension of subject and object relative clauses disambiguated by number agreement or case.

2. Experiment I

In this experiment we tested comprehension of Greek and Italian relative clauses and compared the results directly. Direct comparison was possible because we neutralized case on Greek NPs through the use of neuter gender that is morphologically underspecified for case and thus ambiguous between Nominative and Accusative. In this condition, the disambiguation is brought about by number agreement on the verb in both languages or by the syntactic position of the embedded subject. On the basis of our previous discussion, we expect that Greek and Italian speaking children behave similarly, i.e., we expect that subject relative clauses are easier to comprehend than object relative clauses. We also expect that disambiguation by number agreement is more difficult than disambiguation by syntactic position of the embedded subject, as it was found by Arosio et al. in Italian.

Materials and Method

Participants: Twenty Italian- (M=5;1 SD=0.4 Range: 4;5-5;9) and 37 Greek-speaking children (M=5, SD=0.25 Range: 4;5-5;6) participated to the experiment. Children attended nursery schools in Italy and Greece respectively.

Materials: We constructed 6 triples of 3 types of clauses each introduced by the lead-in "Show me". Each triple included a subject-extracted relative clause and an object extracted relative clause with the embedded subject in the post-verbal position, as illustrated in (5). See Appendix A for a complete set of critical sentences.

(5) a. Il cavallo che sta inseguendo i leoni **OS RC**
a'.To alogo pou kiniga ta liontaria
'The horse that is chasing the lions'

b. Il cavallo che i leoni stanno inseguendo velocemente **OO RC Pre-S**
b'.To alogo pou ta liontaria kinigoun grigora
'The horse that the lions are chasing quickly'

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c. Il cavallo che stanno inseguendo i leoni **OO RC Post-S**
c'.To alogo pou kinigoun ta liontaria
'The horse that are chasing the lions'
'The horse that the lions are chasing'

Since case on Greek NPs was neutralized through the use of neuter gender, it is only the position of the embedded subject (3b) or number agreement on the embedded verb (3c) that disambiguates between subject and object relative clauses.

Procedure: The linguistic materials described above were used for a comprehension task. All participants were tested individually by trained experimenters. The experimental task was preceded by a verb comprehension test aiming at ensuring that participants were able to understand the verbs of the main experiment. The experimental task was also preceded by a training session aiming to familiarize participants with the comprehension of relative clauses. The training session included 3 pictures. In the comprehension experiment an agent selection task was used. The test is an adaptation devised by Adani (in prep) of the De Vincenzi's (1991) test for the comprehension of wh-questions. Participants were presented with pictures including three characters on one sheet of paper and had to point to the one corresponding character. There were 18 pictures in total for the critical items as well as 15 fillers presented in a pseudo-randomized order. An example of a picture is shown in Appendix B. Calculation of accuracy scores included the correct responses, i.e. those responses matching the sentence heard.

Results: The children's performance on each sentence type is presented in Table 1. As shown in Table 1, both Greek and Italian children performed better on subject than object relatives, especially object relatives with postverbal subjects.

Table 1. Accuracy in the comprehension of subject and object relatives in Italian and Greek.

Group	OS Mean (SD)	OO Pre-S Mean (SD)	OO Post-S Mean (SD)
Greek children	65.31 (21.65)	52.25 (24.58)	45.97 (24.05)
Italian children	79.99 (19.19)	54.16 (25.86)	40.82 (27.81)

Statistical analysis confirmed these observations. A 2x3 ANOVA (Language X Relative Clause Type (OS, OOPreS, OOPostS)) revealed a significant effect of relative clause type $F(2,104)=29.849$ $p=.000$, but no significant effect of language $F(1,52)=.016$ $p=.9$. The interaction between Language and Relative clause type was significant $F(2,104)=4.698$ $p=.011$. Further analysis using t-tests indicated that Italian children comprehend OS relatives better than their Greek peers [$t(55)=-2.53$ $p=0.01$]. Separate ANOVA showed an effect of type of clause structures (Greek: $F(2,72)=8,37$, $p<.01$; Italian $F(2,38)=18,63$, $p<.01$). Post hoc Scheffè test showed that Greek children performed significantly better on OS than on both OOPreS and OOPostS (OS vs. OOPostS $p<.01$; OS vs. OOPreS $p<.05$). The same holds for Italian children: OS vs. OOPostS $p<.01$; OS vs. OOPreS $p<.01$). Thus, Italian and Greek children showed by and large the same pattern of performance: subject relatives are comprehended better than either types of object relatives, which is presumably due to the fact that in both languages identical morphological cues were available. Thus, when case

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information is eliminated, Greek children behave as Italian children. While the first prediction, namely that Italian and Greek children should perform similarly, is borne out, the second prediction is not, although a tendency in the expected direction is observed. No difference was found between object relative clauses disambiguated by syntactic position of the embedded subject or by number agreement. For Italian, this is in contrast with what was found by Arosio et al. In fact, the Italian children in this experiment performed slightly worse that their five-year-old peers in Arosio et al. both on subject relative clauses and on object relative clauses with preverbal subjects (percent correct were about 90% and 70% correct, respectively). The difference may depend on the different methods used in this experiment and in the one carried out by Arosio et al. We used a single picture with three characters involved in two actions simultaneously (two cats chasing a dog that in turn is chasing two cats), while Arosio et al. used two pictures with 2 characters each involved in two separate actions (two cats chasing a dog or a dog chasing two cats). It is possible that in a single picture it is difficult to segregate the two actions. This seems a reasonable explanation given that comprehension of subject relative clauses was also lower, although a difference with object relative clauses was found. This explanation may also be extended to Greek.

In summary, the results of this experiment confirm that when case information is neutralized, Greek speaking children comprehend subject relative better than object relatives and no difference is found between object relatives disambiguated by number agreement in the two languages.

3. Experiment 2

The second experiment was conducted only in Greek with the goal of finding out whether object relative clauses disambiguated by number are more difficult to comprehend than object relative clauses disambiguated by case.

Participants: Only the 37 Greek-speaking children (M=5, SD=0.25 Range: 4;5-5;6) participated in the second experiment.

Materials: We constructed 6 triples of 3 types of clauses each introduced by the lead-in "Show me", as in (6).

(6) a. ti maimou pou pleni tin arkouda **OS RC**
'The monkey-ACC that is washing the bear-ACC'

b. ti maimou pou I arkouda pleni me sampouan **OO RC Pre-S**
'The monkey-ACC that the bear-NOM is washing with shampoo'

c. ti maimou pou pleni I arkouda **OO RC Post-S**
'The monkey-ACC that is washing the bear-NOM'
'The monkey that the bear is washing'

Unlike in Experiment 1, NPs displayed unambiguous nominative or accusative case and thus disambiguation of object relatives was brought about by case on the embedded postverbal subject (6c) or by both case and position of the embedded subject (6b). It is expected that object relative clauses disambiguated by Case (and with a postverbal subject) are better understood than object relative clauses disambiguated by number agreement. No difference is expected for object relative

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clauses with preverbal subject (whether NPs are case marked as in this experiment or not as in the first experiment).

Procedure: The same procedure as in the experiment 1 was followed.

Results: The results of the second experiment are presented in Table 2, where we repeat also the results from experiment 1.

Table 2. Accuracy in the comprehension of subject and object relatives in Greek.

Group	OS Mean (SD)	OO Pre-S Mean (SD)	OO Post-S Mean (SD)
Greek children Experiment 1 Number disambiguation	65.31 (21.65)	52.25 (24.58)	45.97 (24.05)
Greek children Experiment 2 CASE disambiguation	72.07 (25.77)	55.4 (25.17)	57.2 (22.4)

We still find an asymmetry between subject and object relative clauses, with subject being comprehended significantly better than both object relative clauses. No difference was found between comprehension of the two object relative clauses. This is confirmed by a one way ANOVA in which the three structures were compared and a significant difference was found, $F(2, 72)=10{,}151$, $p <0{,}001$. Post hoc Scheffè test shows that subject relatives are easier than both types of object relative clauses ($p<0.01$). A further analysis was carried out aiming at comparing the results from experiment 1 and experiment 2. In particular, we wanted to test whether mode of disambiguation influences comprehension of object relative clauses. Thus, we performed several t-tests and found that comprehension of object relative clauses with postverbal subjects disambiguated by number agreement on the verb (5c) is worse than comprehension of object relative clauses disambiguated by case (6c) ($t(36)=-2.61$, $p =.013$) and of object relative clauses disambiguated by position and case (6b) ($t(36)=-2.05$, $p =.04$). No other difference was found, in particular no difference is found between disambiguation by case or by position (and case) (6b vs 6c).

There are three main points that the second experiment revealed. First, the children's performance on object relatives is lower than on subject relatives, as it was in the first experiment. This is in agreement with what is found in other studies and also in adults' sentence processing. Second, the effect of case is significant as shown by the increase of children's performance on object relatives with postverbal subject and disambiguated by case with respect to those disambiguated by number agreement (first experiment). Third, disambiguation by position and case resulted in better comprehension than disambiguation by agreement alone.

Discussion

We discuss our results with respect to the following issues (i) subject-object asymmetry in the acquisition of relative clauses (ii) possible effects of morphological cues (and other cues) on the relative clause comprehension (iii) interplay between cross-linguistic cue exploitation and acquisition of relative clauses.

If we assume that children, as adults, are guided by the Minimal Chain Principle (MCP, De Vincenzi, 1991), then they will postulate a trace in subject position. In other

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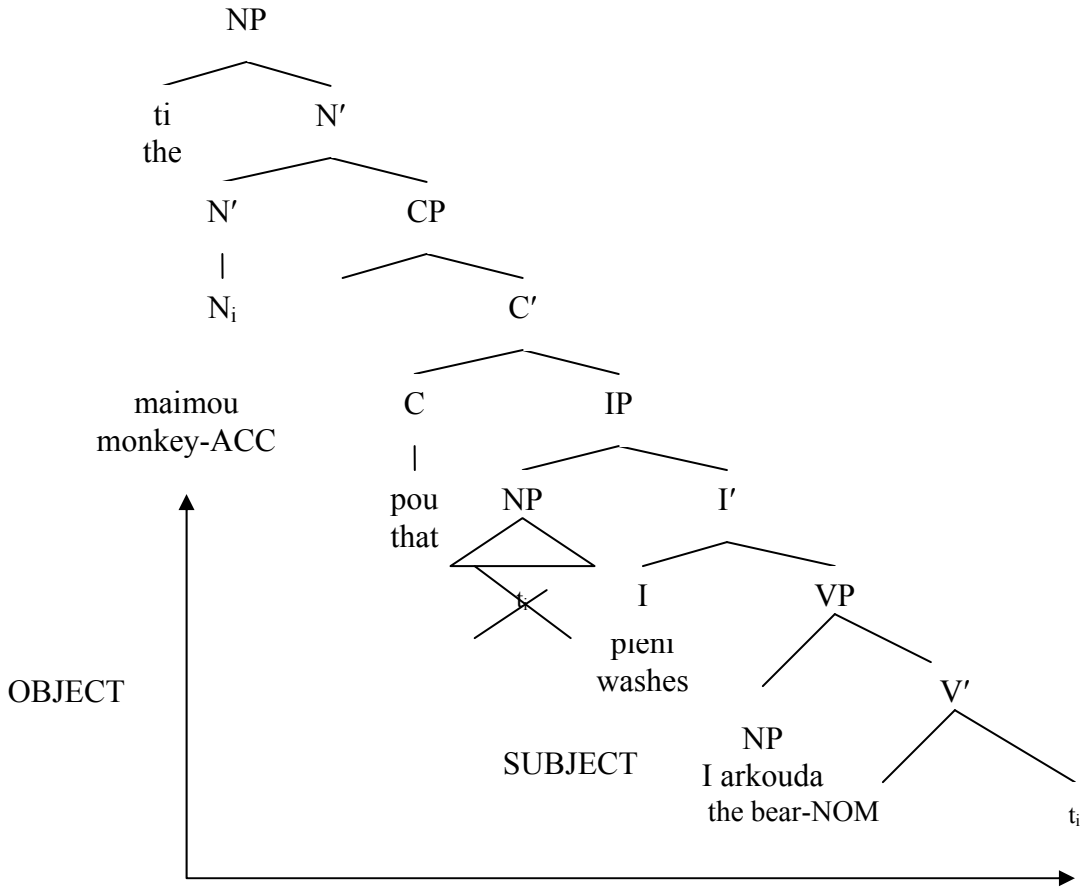
words, the derivation of subject relative clauses is more economic than that of object relative clauses, because the movement in the first case is shorter than in the second (Chomsky, 1995). The results from the Experiment 1 and 2 confirm this dissociation between subject and object relatives in Greek and Italian language acquisition. Recall that due to the use of neuter gender in Greek, Italian and Greek experimental materials had exactly the same morphosyntactic properties. Notice, incidentally, that this result bears on the debate on whether children derive relative clauses by movement (of an empty operator, as in the classical analysis, or of the head, as in Kayne, 1994). If relative clauses were not derived by movement, but by a process of lambda abstraction, as argued by Labelle (1990, 1996), the subject-object asymmetry would be difficult to explain. By contrast, the assumption that they are derived by movement offers an immediate explanation.

Second, results from Experiment 2 indicated that overt morphological case marking contributed significantly to the increase of accuracy scores on the comprehension of object relative clauses with postverbal subject, that is, disambiguation by case on NPs improved children performance with respect to disambiguation by number agreement on verb. This is so, in spite of the fact that disambiguation by case occurs at a later point (at the end of the sentence) than number agreement. This suggests that the particular mode of disambiguation, i.e. case marking, results in a less demanding reanalysis process, likely because the diagnosis process offers clear information about how to repair the structure. This finding is immediately explained within Fodor and Inoue's (2004) Diagnosis model discussed earlier. Assuming that the parser postulates a trace in subject position after the complementizer was heard, it will maintain this analysis until the postverbal nominative NP is encountered. At this point, the subject trace has to be decoindexed from the head of the relative, it must be eliminated (or transformed into an expletive pro) and the subject function must be assigned to the postverbal NP subject.[2] Thus, one grammatical function was assigned before and a new grammatical function is assigned again. At this point, the parser has to look for a trace for the head of the relative clause. But only one possibility is available, based on the verb's argument structure. As the subject function has already been taken over, the trace will be postulated in the object position, as illustrated in (7).

[2] We remain agnostic about whether an expletive pro is inserted in preverbal position (Spec IP) and is coindexed with the postverbal subject, as in Rizzi (1982) or if the structure includes only the postverbal subject.

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(7)



Reanalysis has been successfully carried out and a new representation for the sentence is built. Thus, overt morphological case marking facilitates children in mapping between arguments and surface syntactic position while learning a language. If we put together the results found in this paper and those found in Arosio et al. (2007) the following picture emerges. When the information delivered by the diagnosis process is part of a process involving checking and assignment of the grammatical function, reanalysis is relatively easy and sentences are relatively well comprehended by children. Let us see why. On the assumption that on the first pass parsing, an analysis is attempted according to the MCP with the assignment of the subject grammatical function to one argument (no other argument is present yet as the verb has not been retrieved). This is illustrated in the first column of table 1. When incoming information is incompatible with the preferred analysis, a diagnosis of the problem and a reanalysis of the structure have to be performed. As seen in the second column of table 1, when after the complementizer an NP is found, the subject grammatical role is reassigned. As the verb has not yet been parsed, no other argument is present at that point. Thus, one argument was assigned and an argument has been reassigned. When the postverbal NP marked nominative is found, i.e., at the end of the clause, the subject function is reassigned. Again, one argument was assigned and an argument is reassigned. In addition, as the verb has already been encountered, also the object role is assigned. In contrast, when the disambiguating number agreement on the verb is encountered, no reassignment of the subject function is possible (and neither of the object function).

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Table 3. First pass parsing and reanalysis of relative clauses

Disambiguation cue	First pass	Diagnosis
Position	<a, a: subject	<a, New NP must be subject=a
Case	<a, a: subject	<a,b> Nominative NP must be subject=a And the trace must be object=b
Number agreement 3rd person	<a, a: subject	<a,b> No new subject, no new object

Thus, children, at least at the age of 5 years, can override their preferred analysis, if the diagnosis points to a solution and allows the correction of the illegal grammatical function, as in the first two cases. However, this does not occur in the case of number disambiguation: after the disambiguating information is encountered a grammatical function is not assigned anymore and it is not clear to whom it can be assigned to. In such a situation, children chose not to abandon the preferred analysis and interpret object relative clauses as being subject relative clauses. In other words, children do not engage in an alternative analysis when they have to leave arguments unassigned.

Children, as adults, prefer a subject relative clause, but when prompted by information that is not compatible with this preferred analysis, they abandon it, if the disambiguating information entails a change in the assignment of grammatical functions, but not if these functions remain unassigned, likely because this would require computational resources that exceed children's capacities.

Some problems remain open and deserve further exploration. First, the comprehension scores of Greek relative clauses disambiguated by Case are lower than those found by Stavrakaki (2001) for Greek. This difference may be due to the different methods used. We used pictures, while Stavrakaki used an act out task. Second, the comprehension scores of Italian relative clauses disambiguated by position are lower in this experiment than in the experiment carried out by Arosio et al. (2007). Again different methods were used. Finally, Greek production data seem to indicate that children do not have problems in forming object relative clauses (Stavrakaki 2002, Stathopoulou 2007, Varlokosta 1996). Guasti and Cardinaletti (2003), instead, found that object relative clauses were produced by Italian children (from 5 to 9), but a tendency was observed to transform an object relative clause into a subject relative clause. Nevertheless, children produced both object relative clauses with preverbal subject, as well as object relative clause with postverbal subject, as shown in table 4.

Table 4. Number of object RCs produced by Italian children

Age	Object RCs	
	SV	VS
5	5	4
6	10	8
7	12	17
9	14	9
Adults	5	1

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Although an asymmetry exists between subject and object relatives in production, this asymmetry is less evident than in comprehension. This seems to point toward a dissociation between production and comprehension, with the latter being less advanced than the former, a fact that future research will have to address.

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Appendix A:

1ST EXPERIMENT (IN GREEK AND ITALIAN)

1. OO (without case, +agreement, post-verbal subject)
Show me:

to alogo pou kinigoun ta liontaria
the-horse-neuter-that-are chasing-the-lions-neuter
Il cavallo che i leoni inseguono
The horse that the lions are chasing

To pouli pou kitoun ta gaidouria
The-bird-neuter-that-are-looking-the-donkeys-neuter
L'uccellino che stanno guardano gli asini
The bird that the donkeys are looking at

To provato pou travoun ta gaidouria
The-sheep-neuter-that-are pulling-the-monkeys
La pecora che le scimmie spingono
The sheep that the monkeys are pulling

To agori pou plenoun ta koritia
The-boy-neuter-that-are washing-the-girls-neuter
Il ragazzo che lavano le ragazze
The boy that the girls are washing

To provato pou klotsoun ta aloga
The-sheep-neuter-that-are kicking-the-horses
La pecora che calciano i cavalli
The sheep that the horses are kicking

To kouneli pou htipoun ta pontikia
The rabbit-neuter-that-are-hitting-the-mice
Il coniglio che colpiscono i topi
The rabbit that the mice are hitting

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2. OO (without case, +agreement, pre-verbal subject (with PP at the end))

Show me:

to alogo pou ta liontaria kinigoun me thimo
the-horse-neuter-that- the-lions-neuter -are chasing-with anger
il cavallo che i leoni inseguono con rabbia
The horse that the lions are chasing angrily

To pouli pou ta gaidouria kitoun me iremia
The-bird-neuter-that- the-donkeys-neuter –are-looking-with-calm
L'uccellino che gli asini guardano con calma
The bird that the donkeys are looking at calmly

To provato pou ta gaidouria travoun me to shini
The-sheep-neuter-that-the donkeys-are pulling-with the rope
La pecora che gli asini tirano con la corda
The sheep that the donkeys are pulling with the rope

To agori pou ta koritsioa plenoun me to sampouan
The-boy-neuter-that-the girls-neuter-are washing-with-shampoo
Il ragazzo che le ragazze lavano con lo shampo
The boy that the girls are washing with shampoo

To provato pou ta aloga klotsoun me thimo
The-sheep-neuter-that-the-horses- are kicking-with anger
La pecora che i cavalli calciano con rabbia
The sheep that the horses are kicking angrily

To kouneli pou ta pontikia htipoun me ta podia
The rabbit-neuter-that-the-mice-neuter-are-hitting-with-feet
Il coniglio che i topi colpiscono coi piedi
The rabbit that the mice are kicking

3. OS (without case, +agreement)

Show me:

to alogo pou kiniga ta liontaria
the-horse-neuter-that-is-chasing-the-lions-neuter
Il cavallo che insegue i leoni
The horse that is chasing the lions

To pouli pou kita ta gaidouria
The-bird-neuter-that-is-looking-the-donkeys-neuter
L'uccellino che guarda gli asini
The bird that is looking at the donkeys

To povato pou trava ta gaidouria
The-sheep-neuter-that-is-pulling-the-monkeys
La pecora che spinge le scimmie
The sheep that is pulling the donkeys

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To agori pou pleni ta koritsia
The-boy-neuter-that-is washing-the-girls-neuter
Il ragazzo che lava le ragazze
The boy that is washing the girls

To provato pou klotsa ta aloga
The-sheep-neuter-that-is kicking-the-horses-neuter
La pecora che calcia i cavalli
The sheep that is kicking the horses

To kouneli pou htipa ta pontikia
The rabbit-neuter-that-is-hitting-the-mice
Il coniglio che colpisce i topi
The rabbit that is hitting the mice

2ND EXPERIMENT (ONLY IN GREEK)

1. OO (+case, + post-verbal subject)

Show me:

ti maimou pou pleni I arkouda
the monkey-acc-that-is washing-the bear-nom
the monkey that the bear is washing

ton elefanta pou kiniga I kamila
the-elephant-acc-that-is chasing-the-camel-nom
the elephant that the camel is chasing

tin agelada pou sprohni o elefantas
the cow-acc-that-is-pushing-the-elephant-nom
the cow that the elephant is pushing

to rinokero pou htipai I zevra
the rhino-acc-that-is hitting-the-zebra-nom
the rhino that the zebra is hitting

tin agelada pou kiniga I kamila
the-cow-acc-that-is chasing the camel
the cow that the camel is chasing

ton pithiko pou trava o rinokeros
the-monkey-acc-that-is pulling-the-rhino-nom
the monkey that the rhino is pulling

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2. OO (+case, + pre-verbal subject (with PP at the end)

Show me:

ti maimou pou I arkouda pleni me sampouan
the monkey-acc-that-the-bear-nom-is washing-with-shampoo
the monkey that the bear is washing with shampoo

ton elefanta pou I kamila kiniga me thimo
the-elephant-acc-that-the-camel-nom-is chasing with anger
the elephant that the camel is chasing angrily

tin agelada pou o elefantas sprohni me thimo
the cow-acc-that-the-elephant-nom-is-pushing-with anger
the cow that the elephant is pushing angrily

to rinokero pou I zevra htipai me to podi
the rhino-acc-that-the zebra-nom-is hitting-with the foot
the rhino that the zebra is kicking

tin agelada pou I kamila kiniga me thimo
the-cow-acc-that-the-camel-is chasing-with anger
the cow that the camel is chasing angrily

ton pithiko pou trava o rinokeros me shini
the-monkey-acc-that-the-rhino-nom-is- pulling-with rope
the monkey that the rhino is pulling with rope

3. OS +case

Show me:

ti maimou pou pleni tin arkouda
the monkey-acc-that-is washing-the bear-acc
the monkey that is washing the bear

ton elefanta pou kiniga tin kamila
the-elephant-acc-that-is chasing-the-camel-acc
the elephant that is chasing the camel

tin agelada pou sprohni ton elefanta
the cow-acc-that-is-pushing-the-elephant-acc
the cow that is pushing the elephant

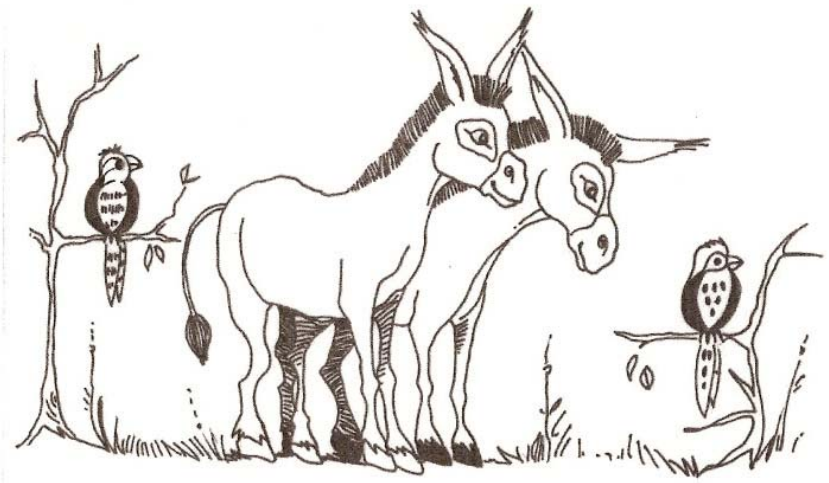
to rinokero pou htipai ti zevra
the rhino-acc-that-is hitting-the-zebra-acc
the rhino that is hitting the zebra

tin agelada pou kiniga tin kamila
the-cow-acc-that-is chasing the camel-acc
the cow that is chasing the camel

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ton pithiko pou trava ton rinokero
the-monkey-acc-that-is pulling-the-rhino-acc
the monkey that is pulling the rhino

Appendix B.



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