ROMANIAN-SPEAKING CHILDREN'S COMPREHENSION OF RELATIVES

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Abstract. The paper investigates the comprehension of right-branching relatives in child Romanian on the basis of experimental data coming from three binary picture-matching tasks. The asymmetry between the comprehension of subject relatives and direct object relatives is accounted for in terms of computational overload. Children's non-target responses to direct object relatives are interpreted as reflecting their immature capacity of fully integrating language knowledge with extralinguistic cues. The results reveal that different pieces of syntactic knowledge are employed differentially through development.

Keywords: comprehension, direct object relative, subject relative, Romanian.

1. INTRODUCTION

Many studies focusing on the comprehension of right-branching relative clauses have revealed an asymmetry between subject relatives (SR) and direct object relatives (DOR) in several languages (Arosio *et al.* 2009 for Italian, Friedmann and Novogrodsky 2007 for Hebrew, Schriefers *et al.* 1995 for German, Morrill and Gavarro 2010 for Catalan, among many others). Some recent studies, though, have shown that this asymmetry is not attested across languages (see, for example, Stavrakaki 2001). Fine grained analyses of the elements which influence the comprehension of DORs revealed the importance of language specific properties (Arosio *et al.* 2007, Guasti *et al.* 2008, Friedmann *et al*. 2009).

The present paper investigates the comprehension of right-branching restrictive relatives in child Romanian, with a two-fold goal. First, it addresses the question whether the subject/ direct object asymmetry reported for several languages holds for Romanian as well. Second, it looks into the role of language specific factors in the comprehension of Romanian DORs from a developmental perspective. It relies on data coming from three binary picture-sentence matching tasks. The comprehension results are compared to production data reported in previous studies.

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The organization is as follows. Section 2 presents the main properties of Romanian DORs in comparison to SRs. In Section 3, the three experiments and their results are presented. Section 4 discusses the main findings across the three tasks. We argue that children know the syntax of relatives early. Their non-target responses in the comprehension tasks are accounted for in terms of non-adult like strategies employed by the early system in order to integrate syntactic knowledge and contextual cues. Section 5 summarizes the main conclusions.

2. MAIN PROPERTIES OF ROMANIAN DIRECT OBJECT RELATIVES

Standard DORs in Romanian are introduced by the d-linked *wh*-pronoun *care* 'who, which' preceded by the preposition *pe*, standardly analysed as an accusative case marker:

(1) Băiatul **pe** care îl vede.
boy-the $_{SG\ M}$ *pe* who him $_{AC\ 3rd\ M\ SG}$ sees
'The boy whom he sees.'

The presence of *pe* signals that the relative clause is a DOR, banning a SR interpretation. In (1), it acts as an unambiguous indicator that the clause is a DOR. In the spoken language, though, the preposition may be omitted (Guțu Romalo 2000, among many others), which can create an ambiguous context, in which the same clause can be interpreted both as a SR and as a DOR:

(2) Băiatul (pe) care îl vede.
boy-the $_{SG\ M}$ *pe* that him$_{AC\ 3rd\ M\ SG}$ sees
'The boy that he sees/The boy that sees him'

According to Grosu (1994), relative connectors that are not preceded by the preposition should be analyzed as relative complementizers, and not as DPs. The two types of DORs, with and without a preposition, are argued to result from two different derivations: the DORs introduced by a bare *care*, a relative complementizer in Grosu's terms, do not involve *wh*-movement, whereas the DORs introduced by a DP do.

Both standard and non-standard DORs have an obligatory accusative direct object clitic, as seen in (1) and (2), which co-refers with the head of the relative. Clitic omission is never an option. However, the mere presence of the clitic cannot straightforwardly distinguish between a DOR (3a) and a SR (3b):

(3) a. Băiatul care îl vede (Ion).
boy-the $_{SG\ M}$ that him $_{AC\ 3rd\ M\ SG}$ sees (Ion)
'The boy whom Ion sees.'

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b. Băiatul care îl vede (pe Ion).
boy-the $_{SG\ M}$ that him $_{AC\ 3rd\ M\ SG}$ sees (*pe* Ion)
'The boy who sees Ion.'

Relative clauses without *pe* may be ambiguous if their subject is null; as shown above, (2) can be construed as a SR ('The boy who sees him') or as a DOR ('The boy whom he sees'). Thus, the clitic itself may fail to disambiguate between the SR and the DOR readings. In fact, the clitic turns into a disambiguator only if it has *phi*-features distinct from those of the relative head, as in (4), in which case only the SR reading is available:

(4) Fata care îl vede.
girl-the $_{SG\ F}$ that him $_{AC\ 3P\ M\ SG}$ sees
'The girl who sees him.'

An overtly realized pre-verbal or post-verbal subject (5) in the embedded clause bans the SR reading even when *pe* is omitted:

(5) Băiatul care (tata) îl vede (tata).
boy-the$_{M\ SG}$ that (father) him $_{AC\ 3rd\ M\ SG}$ sees (father)
'The boy whom father sees.'

The different positions in which the overt subject can occur correlate with different information structures; the pre-verbal subject is interpreted as a topic or a focus (Cornilescu 1997), whereas the post-verbal one is the unmarked choice. Importantly, an overt lexical subject can be used only in a DOR. SRs allow an overt subject only marginally; in this case, the subject has to be a strong pronominal, interpreted as focus[3].

The *phi*-features on the verb can also signal a DOR reading, provided they differ from those on the relative head, as in (6):

(6) Băiatul care îl desenez.
boy-the$_{M\ SG}$ that him$_{AC\ 3rd\ M\ SG}$ see $_{1st\ SG}$
'The boy whom I draw.'

Summing up, this section has shown that in Romanian the presence of the preposition *pe* on the relative pronoun clearly and unambiguously distinguishes between a SR and a DOR reading. However, the input which children receive contains both *pe* marked DORs and non-*pe* marked DORs. In the absence of the preposition, an overt subject strongly favours a DOR reading. If the subject in the

[3] In Romanian, SRs can have an overt subject only if this is an emphatic pronominal:
(i) Omul care **el însuşi** nu ştie ce vrea....
man-the who he himself not knows what wants

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relative is null, a DOR reading is facilitated by the properties of the *phi*-features of the verb or by the *phi*-features of the clitic. Since the number and the nature of the elements which force a DOR reading may be different, one can predict that DORs are not equally difficult to comprehend.

3. TESTING THE COMPREHENSION OF RELATIVE CLAUSES BY ROMANIAN CHILDREN

3.1. The comprehension of subject and object relative clauses

The first experiment – a binary sentence-picture matching task[4] – tapped into the comprehension of subject and direct object relatives.

3.1.1. Materials and design

The experiment included 16 test items (8 SRs, 8 DORs), 2 warm-up scenarios, and 4 control sentences. The test sentences contained transitive predicates which denoted semantically reversible events. The two DPs present in each sentence had exclusively [+ animate] referents (to factor out animacy) and they were all [+singular]. The DORs contained the accusative marking preposition *pe* and a post-verbal lexical subject. The trials were balanced such that in 4 test items the head and the subject of the relative had the same gender features (7a), and in the other 4 there was gender mismatch between the two. In the "gender mismatch" sentences (7b), the *phi*-features on the obligatory accusative clitic also contributed to imposing a DOR interpretation:

(7) a. Arată-mi pisoiul **pe** care îl piaptănă **ariciul.**
show me cat-the$_{\text{M SG}}$ *pe* that him$_{\text{AC 3RD M SG}}$ combs hedgehog-the$_{\text{M SG}}$
'Show me the hedgehog that the cat is combing.'

b. Arată-mi zebra **pe** care **o** piaptănă **tigrul.**
show me zebra-the$_{\text{FEM SG}}$ *pe* that her$_{\text{AC 3RD M SG}}$ combs tiger-the$_{\text{M SG}}$
'Show me the zebra that the tiger is combing.'

The SRs were similar in length to the DORs and, importantly, they contained a clitic doubled direct object (8), such that they minimally differed in length from the DORs used in the task and so that ambiguity was avoided:

(8) Arată-mi tigrul care îl piaptănă pe iepuraş.
show me tiger-the$_{\text{M SG}}$ that him$_{\text{AC 3RD M SG}}$ combs *pe* rabbit$_{\text{DIM}}$
'Show me the tiger that is combing the little rabbit.'

[4] We thank Teresa Guasti for her advice with respect to the design of the task as well as for generously providing the testing materials.

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The task was administered as a power point presentation run on a portable computer in a quiet room at the children's kindergarten. Each subject was tested individually. Two pictures were presented on the computer screen and the child was asked to point to the picture which matched an orally presented relative clause, preceded by "Show me…" (Figure 1).



Fig. 1. A picture-pair used in task 1

The picture pairs were presented in randomized order so that no more than three identical relative clauses were targeted. The correct picture of the pair was varied so that the picture which matched the orally presented relative clause should not be on the right/left side for more than three consecutive trials.

3.1.2. Participants

57 monolingual Romanian children, with ages ranging between 2;11-7;5 (mean age: 5;3, SD: 1.087) took part in the experiment. The data are summarized in Table 1.

Table 1

Participants in task 1

Age group	Nr. of participants	Mean age	Standard deviation
2;11 – 4;11	19	3;8	.55169
5;0 – 5;11	20	5;4	.02964
6;0 – 7;5	18	6;3	.45902

The children were recruited from three kindergartens[5] in Bucharest. The group consisted of 26 girls and 31 boys, with no diagnosed speech impairment or attention deficit, from families of various SES. A control group of 10 adults was also tested.

3.1.3. Results

The results reveal an obvious subject-object asymmetry in the comprehension of relatives. The children in our study understood SRs almost target-like: the

[5] We thank the children, the teachers and the parents of the following kindergartens for their help and constant support with the experiments reported in the present study: Bambi (Step by step), Kindergarten nr. 1, and Kindergarten nr. 203.

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group-level performance reached 91.51%. In the case of DORs, the group-level performance was lower: 63.59 %. Adults, as expected, performed at ceiling. A chi-square test confirmed that the difference in comprehension between the two types of relatives is statistically significant (χ^2 (1) = 93.90, p < .001). The results are summarized in Figure 2:

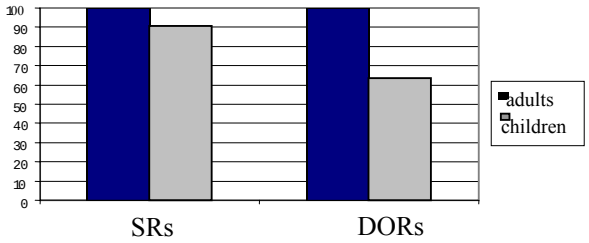


Fig. 2. Comprehension of DORs and SRs in Romanian.

When looking at individual results, the asymmetry is confirmed once again. No participant answered below chance in the SR condition but several did so in the DOR condition. The data are summarized in Table 2:

Table 2

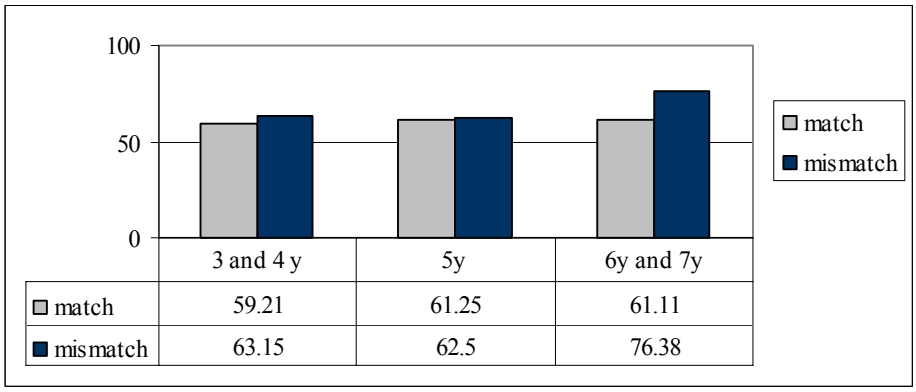
The comprehension of SRs and DORs across age groups

Type of relative	**3-4 year olds**		**5 year olds**		**6-7 year olds**	
	Target answers	Subjects who answered below chance	Target answers	Subjects who answered below chance	Target answers	Subjects who answered below chance
SR	86.18%	0	91.25%	0	94.44%	0
DOR	61.18%	7	61.87%	6	68.05%	2

The data indicate that even 7-year-olds may find the comprehension of DORs difficult: some children in this age group gave either at chance or below chance answers. But, at the same time, in the 4-year-old group, some children gave 100% target answers in both the SR and the DOR conditions. The analysis of individual results reveals that there is indeed a subject-direct object asymmetry but also that there are children who, at the age of four, can already understand both SRs and DORs target-like.

The difference between the rate of correct responses to DORs with gender feature match and to those with gender feature mismatch was not significant (60.5% vs. 67%). Developmentally, the only difference is noticed within the 6-year-old group, where the rate of correct responses is higher for the mismatch condition. The data are summarized in Figure 3.

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	3 and 4 y	5y	6y and 7y
match	59.21	61.25	61.11
mismatch	63.15	62.5	76.38

Fig. 3. Correct responses (%) for gender match/mismatch relatives.

3.2. The role of *pe* and of the subject in the comprehension of DORs

As mentioned in section 2, the input which children receive is variable, it contains both *pe* marked and non-*pe* marked DORs. Production data (Sevcenco *et al.* 2009, 2012) reveal a very high percentage of *pe* omission in the early grammar. Our second experiment investigated precisely whether an element which seems to be practically absent in production is relevant in comprehension. Recall that the presence of *pe* on the relative pronoun forces a DOR reading, i.e. it is a salient indicator that the SR reading is banned. Another important indicator that the SR reading is excluded is the presence of an overt subject, which can occur both in pre- and in post-verbal position. This experiment also explored whether the syntactic position of the subject in the DOR makes a contribution towards a better understanding of this type of relative.

3.2.1. Materials and design

The experiment consisted of a binary sentence-picture matching task, whose main design and administration were identical to those of the task presented in 3.1. The set of pictures was different (see Figure 4).

The test included 16 test items, 2 warm-up scenarios and 3 control picture pairs. Four conditions were tested: (i) + *pe* + pre-verbal subject (4 test items) (9), (ii) + *pe* + post-verbal subject (4 test items) (10), (iii) − *pe* + pre-verbal subject (4 test items) (11) and (iv) − *pe* + post-verbal subject (4 test-items) (12):

(9) pisoiul **pe** care **aricii** îl scoală
cat-the$_{\text{M SG}}$ *pe* who hedgehogs him $_{\text{AC 3RD M SG}}$ wake.up
'the cat whom the hedgehogs are waking up'

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(10) broaştele **pe** care le salută **testoasa**
frog-the$_{\text{FEM PL}}$ pe who them $_{\text{AC 3RD FEM PL}}$ greets turtle-the
'the frogs whom the turtle is greeting'
(11) iepuraşii care **şoricelul** îi scarpină
rabbits-the which mouse-the them $_{\text{AC 3RD M PL}}$ scratch
'the rabbits which the mouse is scratching'
(12) rața care o mîngîie **iepuraşii**
duck-the which her $_{\text{AC 3RD FEM SG}}$ stroke rabbits-the
'the duck which the rabbits stroke'

Number match/mismatch between the relative head and the subject in the relative was balanced across the test items.



Fig. 4. A picture-pair used in task 2.

3.2.2. Participants

Thirty-three monolingual Romanian speaking children participated, with ages ranging from 3;9 to 6;8. The data are summarized in Table 3.

Table 3

Participants in task 2

Age group	Nr. of participants	Mean age	Standard deviation
3;9 – 4;11	17	3;9	.32533
5;0 – 6;8	16	5;3	.47570

The children were recruited from the same three kindergartens as in the first experiment. The group consisted of 13 girls and 20 boys, with no diagnosed speech impairment or attention deficit, from families of various SES. A control group of 10 adults was also tested.

3.2.3. Results

DORs with the preposition *pe* preceding the relative pronoun were understood in 73.86% of the cases, whereas the comprehension of those without *pe* amounted to 70.45%. DORs with a pre-verbal subject were better understood than those with a post-verbal subject: 78.4% versus 65.9%. The data are summarized in Figure 5.

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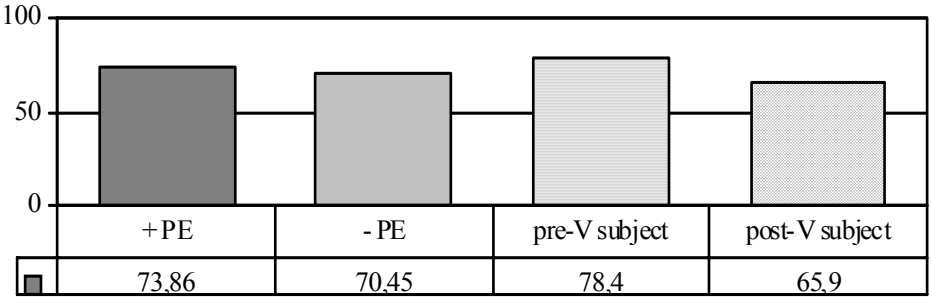


Fig. 5. Comprehension task 2. Percentage of target responses.

A mixed factorial ANOVA with mean percentage correct as dependent variable, *pe* marking (present, absent) and subject position (pre-verbal, post-verbal) as within-subject variables and group (3-year-olds, 5-year-olds) as between-subject variable indicated a main effect of position ($F(1,31)=10.46$, $p<.003$, $\eta 2 = .25$). Children did better in the pre-verbal subject condition than in the post-verbal one. There was also an effect of age; the 5-year-olds performed better than the 3-year-olds overall ($F(1,31)=4.45$, $p<.043$, $\eta 2 = .13$). No other effects or interactions were found. Adults answered at ceiling.

3.3. The role of agreement and of the overt subject in the comprehension of DORs

As already mentioned, DORs without *pe* may be ambiguous. However, the results in task 2 indicated that the presence or absence of *pe* had no significant effect on the comprehension of DORs. Our third experiment investigated what kind of syntactic properties children rely on when dealing with a DOR relative. In this task, we tested the role of an overtly realized subject, the role of number agreement on the verb when the subject is null, and the role of the obligatory accusative clitic. We factored out *pe*: all the DORs used as test items lacked the preposition *pe*.

3.3.1. Materials and design

The experiment consisted of a binary sentence-picture matching task, whose main design and administration were similar to the ones used in the previous two tasks. The pictures were the same as those used in task 2.

It contained 18 test items and 4 control sentences and 2 warm-up items. The test items included DORs disambiguated by different cues:

(i) 6 DORs disambiguated only by the agreement features on the verb in the relative, which were different from the *phi*-features of the relative head. The verb was always marked for the plural, and the relative head was singular:

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(13) fata care o **stropesc**
girl-the$_{\text{FEM SG}}$ who her $_{\text{AC 3RD FEM SG}}$ splash $_{\text{3RD PL}}$
'the girl whom they are splashing'

(ii) 6 DORs disambiguated only by a post-verbal subject:

(14) prințesa care o fotografiază **piticul**
princess-the $_{\text{FEM SG}}$ who her $_{\text{AC 3RD FEM SG}}$ photographs dwarf-the
'the princess whom the dwarf is photographing'

(iii) 6 DORs disambiguated only by the clitic, which had the same *phi*-features as the relative head. In order to factor out agreement, the verb was selected from a class where the 3rd person singular and plural forms of the present tense of the indicative are homophonous. Such sentences, as mentioned in Section 2, are highly ambiguous; in the absence of extra-linguistic information, it is impossible to assign a SR or a DOR interpretation to these relatives, though there is a SR bias.

(15) broaştele care le salută
frog-the $_{\text{FEM PL}}$ who them $_{\text{AC 3RD FEM PL}}$ greet/s
1: 'the frogs whom they/he is/are greeting'
2: 'the frogs that are greeting them.'

3.3.2. Participants

Twenty-five monolingual Romanian children, 11 girls and 14 boys, aged between 4;0 and 7;5, participated in this task. They all took part in the first comprehension task as well. A control group of 10 adults was also tested. The data are summarized in Table 4:

Table 4

Participants in task 3

Age group	Nr. of participants	Mean age	Standard deviation
4;0 – 4;11	7	4;6	.04276
5;1 – 5;11	9	5;3	.02369
6;0 – 7;5	9	6;5	.52479

3.3.3. Results

DORs with post-verbal subjects were understood in 80.29% of the cases, DORs with a null subject but disambiguated by agreement on the verb were comprehended 67.9%, whereas DORs with only a clitic as a disambiguator were the most poorly understood: 51.23% (Figure 6). The post hoc analysis has revealed that no significant difference holds between the comprehension of DORs with an overt subject and the comprehension of DORs with a null subject but disambiguated by the *phi*-features of the verb (U = 229.50, z = - 1.67, ns).

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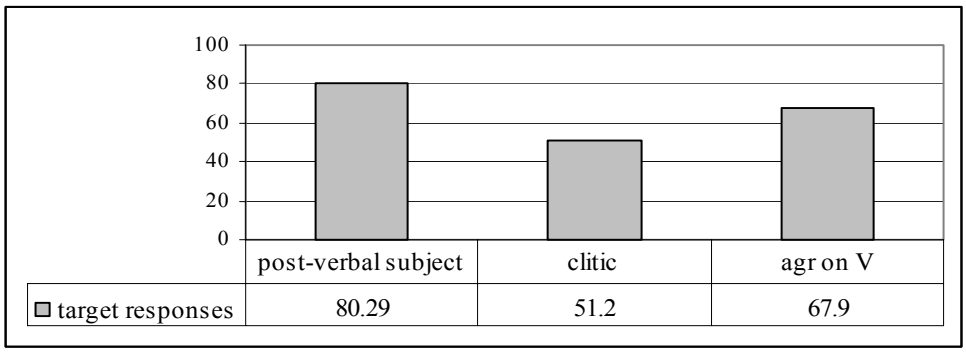


Fig. 6. Comprehension task 3. Percentages of target responses

A repeated measures Anova with mean percentage correct as dependent variable, Condition (clitic, agreement, post-verbal subject) as within-subject variable and Group (4-year-olds, 5-year-olds, 6-year-olds) as between-subject variable indicated a main effect of Condition ($F(2,44)=13.88$, $p<.000$, $\eta^2 = .39$). Bonferroni post-hoc tests showed that sentences disambiguated only by the accusative clitic were significantly more difficult than both sentences disambiguated by agreement on the verb ($p=.041$) and sentences disambiguated by the post-verbal subject ($p<.001$). Separate repeated measures Anovas were conducted for each age group. They reveal that there is no effect of Condition for 4-year-olds, whereas 5-year-olds performed better on sentences disambiguated by the post-verbal subject than on sentences disambiguated only by the accusative clitic ($p<.001$) and sentences disambiguated by agreement on the verb ($p<.026$). For the 6-year-olds, the answers for the sentences disambiguated by post-verbal subjects were significantly more often correct than the answers for the sentences disambiguated only by clitics ($p<.028$). Also, 6-year-olds performed better on sentences disambiguated by number agreement on the verb than on sentences disambiguated by clitics alone ($p<.007$). If we compare performance against chance for the three age groups separately, we conclude that the 4-year-olds are at chance on all sentences, the 5-year-olds are above chance only on the sentences disambiguated by a post-verbal subject ($t(8)=10.55$, $p<.001$) whereas the 6-year-olds are better than chance on both the sentences disambiguated by a post-verbal subject ($t(8)=6.86$, $p<.001$) and on those disambiguated by number agreement on the verb ($t(8)=4.13$, $p<.003$).

The adult controls answered at ceiling with the exception of two participants who gave a non-target response to one of the sentences in the clitic condition (i.e. the ones which were ambiguous).

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4. DISCUSSION

4.1. Subject-direct object asymmetry

The results obtained in experiment 1 reveal an obvious asymmetry in comprehension between SRs and DORs: children comprehended SRs better than DORs. The number of the participants who answered below chance was higher in the DOR condition, whereas the SR results were almost at ceiling. In this respect, our findings are in line with what has been reported for several other languages (see, for example, the other papers in this issue).

The rate of correct answers was higher overall with the older participants. The analysis of individual results, however, reveals that at the age of 7, some children are still at or below chance with DORs, while in the 4-year-old group there are children who answer at ceiling in both conditions. This indicates that, at the age of four, Romanian children have knowledge of the grammar of DORs (see Adani 2011 for similar results for Italian). Our conclusion is reinforced by previous studies which focused on the production of relatives (Sevcenco *et al.* 2009, 2012). Longitudinal data show that Romanian children begin to use DORs early, almost concurrently with SRs (before the age of 3). In a preference task which elicited both SRs and DORs (the task was identical to the one reported in the papers by Ezeizabarrena or by Gavarró *et al.* this issue; the participants were 22 monolingual Romanian children, age range 5;00-6;11 and 12 adult controls), children produced SRs 89.5% and adults 98%. The DORs production rate was lower for adults (21%) than for children (32.7%), which shows that adults avoid producing DORs more than children do (Sevcenco *et al*. 2009). Similar results have been reported for other languages (see, for example, Belletti and Contemori, this issue).

With respect to DOR production, children do not behave differently from adults. There is an obvious difference between children and adults only with respect to comprehension: only children gave non-target responses in the comprehension task; adults' answers were at ceiling.

Recent studies have explained the subject-direct object asymmetry in production and comprehension in terms of computational cost. At the core of various accounts lies the idea that DORs are computationally more demanding because they involve long distance dependencies over an intervener: the relative head establishes a dependency with the direct object "gap" over a nominal constituent (Grillo 2009, Friedmann *et al*. 2009). SRs differ from DORs in that they do not include an intervener (16a vs. b):

(16) a. **The girl** that < > saw us.
b. **The girl** that I saw < >.

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Computation load may be due to an overt lexical NP which intervenes between the raised relative head and the relativization site, as assumed in Friedmann *et al.* (2009); or, as we would like to suggest, along similar lines, to a dependency across phases. Probing into an earlier phase (minimal search) can be hindered by intervention effects (Chomsky 2008). Such dependencies "overflow memory" (Chomsky 2006), which predicts that working memory can play an important role (see Weighall and Altmann 2010 and references therein, among others).

As we saw, previous results for Romanian indicate that indeed the difficulty due to intervention effects is reflected in avoidance of DORs production with both adults and children (Sevcenco *et al*. 2009). The data used in the present study, however, reveal that in comprehension, adults find the necessary strategy to cope with this computation overload; their answers are at ceiling[6] in this task. Only children gave non-target responses[7]. The adult-child asymmetry observed in the comprehension task, then, cannot be accounted for in terms of intervention effects alone. We suggest that children's non-target answers reflect an immature capacity of exploiting grammatical knowledge in the binary picture context provided in the task: a relative clause which they heard (and which they had to hold in memory) had to match one of two given pictures[8] . Incapacity of holding both DPs in working memory (see also Arosio *et al.* 2011) might turn the sentence into an ambiguous one.

The nature of the non-target responses could be better understood if one started from a careful examination of the computational process involved in DORs and the way in which it interferes with contextual information, i.e. the visual context. Importantly, we do not believe that the results are a task artifact. What we are suggesting is that the answers should be analysed *in relation to* the task design. The questions to which this line of reasoning leads are: (i) how good are children at exploiting syntactic knowledge when they have to match a computationally costly sentence (which involves dependencies across phases and hence intervention effects and memory overflow) to a given visual context?; (ii) what kind of syntactic knowledge do children rely on?, i.e. do they exploit one particular type of knowledge and, if they do, do they rely on the same type of knowledge at different acquisition stages?

[6] A reviewer points out that even with adults DORs are more difficult, but that in their case the difficulty is reflected in slower timed answers. In our experiments, it is true, we did not measure response time. But we believe that what our data indicate without any doubt is that adults manage to give correct answers (be they slower timed ones) 100%, whereas children give both target and non-target answers.

[7] Differences between production and comprehension data or between naturalistic and experimental data are most probably the reflex of task effect and/or of principles not specific to narrow syntax.

[8] See also Adani (2011) for discussions concerning task effects and the different results obtained on different tasks by Hebrew children, reported in Friedmann *et al.* (2009).

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We think that the results obtained in tasks 2 and 3 can offer a glimpse into the matter.

4.2. The role of the preposition *pe*

Another finding is that the presence of the preposition *pe* plays no part in the comprehension of DORs[9] for either of the age groups involved in task 2. If one assumes that *pe* is a case marker on the relative pronoun, our results do not fall in line with several cross-linguistic data. Case marking counts as a facilitating cue in both Greek (Stavrakaki 2001, Guasti *et al.* 2008) and German (Yatsushiro *et al.* 2010), but plays no significant part in Romanian. These results mirror the high omission of *pe* in production (Sevcenco *et al.* 2009, 2012).

In contemporary Romanian two different systems are available – one with DORs introduced by a DP, where the preposition precedes the relative pronoun, and whose derivation involves head raising, and one with DORs introduced by a complementizer, i.e. without *pe,* in which the head is generated outside the relative; this creates a variable input. Children seem to opt for a system in which DORs are introduced by an invariable complementizer, apparently choosing the non-movement construction. The higher percentage of DORs with *pe* with older children and with adults is, most probably, the reflex of schooling (see Sevcenco *et al.* 2012).

4.3. The null – overt subject asymmetry

The results of task 3 reveal that DORs with a post-verbal subject trigger a higher rate of correct answers (80.29%) than DORs with a null subject (67.9%). Actually, our overall results indicate, as expected, that an *overt* subject will boost comprehension, with a slight advantage for DORs with a pre-verbal subject (see the results in task 2). However, this does not necessarily entail that DORs with a post-verbal subject are taxing (as seems to be the case in Italian, Adani 2011). At first sight, across the three tasks, the overall results for the comprehension of DORs with a post-verbal subject are slightly different: 63.59% in task 1 and 65.9% in task 2 vs. 80.29% in task 3. The difference cannot be attributed to task effect, since the same design was used in all experiments. The visual contexts used in tasks 2 and 3 came from the same set of pictures. We believe that the difference is due to two factors: age difference and individual variation. The 25 children who participated in the third experiment had taken part in experiment 1 as well, which allowed a comparison of the rate of correct answers for the same group of subjects across the two tasks. The results are summarized in Table 5.

[9] As a reviewer points out, the results concerning the role of the preposition *pe* in comprehension challenge a processing account of the data.

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Table 5

Correct answers in tasks 1 and 3 (DORs with a post-verbal subject)

Nr. of subjects	Age range	Task 1	Task 3
25	4;0 – 7;5	78.8%	80.29%

The results indicate three things. Firstly, there is no significant difference between the rate of target answers across the two tasks when the results come from the same subjects. Secondly, they reinforce our conclusion that the presence of the preposition *pe* does not facilitate relative clause comprehension. The test items in task 1 were all + *pe* DORs, whereas the ones in task 3 were all – *pe* DORs. What children seem to exploit in their comprehension of DORs is the presence of an overt subject, not the preposition. Thirdly, the high percentage of correct answers for the DORs with a post-verbal subject in task 3 indicates that a post-verbal subject can also enhance comprehension. The number of children in the 5- and 6-year-old group who took part in task 2 is smaller, which might explain the lower percentage of target responses in this task both for DORs with a pre-verbal subject and for DORs with a post-verbal subject.

We interpret the data as indicating that an overt subject, irrespective of its position, strongly favours a DOR reading; children use this syntactic property of DORs in the sentence-picture matching task. A SR reading is blocked in the presence of an overt lexical subject (see section 2). However, not all the children are able to exploit this fully; in task 3, the group result for the 3-year-olds is at chance level in all conditions. When the DOR has a null subject, in the absence of distinct agreement features on the verb, the relative is ambiguous and, as expected, the answers were at chance (see the results obtained in task 3, Figure 5). Such sentences turned out to be difficult for some adults as well. Two out of 10 adults in the control group gave "guessing" answers to one of the sentences in the clitic condition. The difficulty, we believe, derives both from the inherent ambiguity of the sentence and from the visual context created by the task design. These test items, outside the task, are primarily interpreted as SRs (in accordance with Keenan's accessibility theory). It is the binary picture context which highlights the two readings (SR and DOR). Adults cope better with the task than children do, i.e. they can integrate syntactic knowledge with the visual scene in order to solve the ambiguity.

Returning to the null – overt subject asymmetry, given the high percentage of correct answers for the DORs with a post-verbal subject (in tasks 1 and 3) as well as the target responses in both the pre- and the post-verbal subject conditions in task 2, one can safely conclude that DORs with an overt lexical subject are comprehended better than those with a null subject. Similar findings are reported in Bențea (this issue), on the basis of a different task.

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4.4. The pre- vs. post-verbal subject asymmetry

Though any overt subject seems to enhance comprehension, in task 2, where we directly compared the comprehension of DORs with pre- and with post-verbal subjects, the results reveal an asymmetry between the comprehension of DORs with a pre-verbal and of those with a post-verbal subject; the former are comprehended better. Similar results are reported for Italian. Adani (2011), for example, accounts for this asymmetry in terms of agreement. When the subject occurs in post-verbal position, i.e. in Spec VP, verb agreement is checked only once through the operation AGREE between the verb in Inflection and the *in situ* subject. A pre-verbal subject triggers a more robust subject-verb agreement; in this case, verb agreement is checked in two-steps: first via the operation AGREE (between the *in situ* subject and the verb in Inflection) and then via Spec-head checking between the verb in Inflection and the DP subject in Spec IP. The "fragility" of agreement in the configurations with a post-verbal subject triggers a higher number of non-target responses with 4- and 6-year-olds. By age seven, the participants in her study are able to use this fragile agreement to block the SR interpretation more often.

For Romanian, however, the data are less clear cut. As already discussed in section 4.3, there was no significant difference between the results of the same 25 participants in tasks 1 and 3. Though we believe that agreement features are exploited in the comprehension of relatives (see the next section), there might be an alternative way to account for the observed asymmetry in task 3. In Romanian, as mentioned in section 2, in DORs the unmarked position of the subject is the post-verbal one. In DORs a pre-verbal subject is necessarily associated with a topic/focus interpretion, which can more categorically block the SR interpretation. This could account for the pre- vs. post-verbal subject asymmetry in task 3.

Assuming that production and comprehension are facilitated or hindered by the same elements, we would expect children to avoid producing DORs with post-verbal subjects. But in the longitudinal data, the very early DORs have a post-verbal subject. In one corpus, for example, the first attested DOR has a post-verbal subject (Sevcenco *et al*. 2012):

(17) Un brăduț care a adus Moş Crăciun.
a fir-tree $_{DIM}$ that has brought Santa Claus
'A fir tree which Santa Claus has brought.' [B. 2;07]

Actually, for DORs with an overt subject, one notices a preference in production for the post-verbal position both with adults and children. In an elicitation task (the preference task presented in Gavarró *et al.* this issue), reported in Sevcenco *et al.* (2009), children produced several DORs with a post-verbal subject; the number of DORs with a pre-verbal subject is very low. On the other hand, in a frog story

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corpus (Buja 2008), we found only 12 restrictive DORs overall (children and adults) but no DOR had an overt subject. Such data confirm what one expected: that subject use, null vs. overt, pre- vs. post-verbal interferes with discourse information structure requirements in relative clauses as well. The fact that in our second task DORs with a pre-verbal subject were comprehended better than those with a post-verbal subject reflects children's knowledge of syntactic properties and their early sensitivity to discourse information structure. They know that DORs freely allow a lexical subject whereas in SRs the subject can be overt only if it is a strong pronominal with a focus feature. When the overt subject (a lexical DP) of a DOR occurs in pre-verbal position, it has a topic or focus feature, which makes it more salient and bans the SR reading. The 3-year-olds seem to rely mainly on the topic/focus feature of the lexical subject. The rate of target responses to DORs with a pre-verbal subjet is high: 75%.

At the same time, given the high percentage of correct answers for the DORs with a post-verbal subject (in tasks 1 and 3), one can safely conclude that the post-verbal subject may also act as a facilitator. Any *overt* subject can act as a facilitator. If it is a topic or a focus it triggers a higher number of target responses. The analysis of the results for each sentence in task 1 reveals that gender feature mismatch does not significantly improve comprehension until the age of 6. The rate of correct responses of the 4 and 5-year old participants is not different for the DORs with gender feature match from those with gender feature mismatch. The oldest group, however, exploits gender feature mismatch and the rate of correct responses is higher for those DORs in which the head and the subject have different gender features. This correlates with the results in task 3, which indicate that only older children are able to exploit the *phi*-features on the verb in the comprehension of DORs (see the following section).

4.5. The role of agreement

The overall results obtained in task 3 reveal that *phi*-features on the verb represent as strong a facilitator as an overtly realized post-verbal subject does. The role of verbal agreement, though, is not the same across age groups. The 5-year-old group performed better in the post-verbal subject condition than they did in the number agreement one. The 6-year-old group did not show this preference, their performance in either of these conditions being equally good. The youngest group answered at chance.

When the sentence had a null subject and the agreement features on the verb were not distinctive, children, across age groups, "guessed". Actually, this is what some adults in the control group did as well.

Summing up, 5-year-olds make use of the overt subject in their comprehension of relatives. The 6- and 7-year-olds make use of both number agreement and the overt subject. The results indicate that children exploit syntactic knowledge

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differently at different ages: younger children use only the lexical subject and topic/focus features, while older children are able to exploit both the *phi*-features on the verb and the gender features of the head and of the subject of the relative.

4.5. The role of the pronominal clitic

Finally, one more finding concerns the role played by the obligatory accusative clitic. The results obtained in task 3 reveal that a direct object clitic alone does not contribute to the disambiguation of the relative clause. The answers were, across age groups, at chance. The children could not exploit the clitic because the structure alone does not allow the identification of the antecedent. Since these sentences are structurally ambiguous, children face the task of building two representations for them (SR and DOR) and then of deciding, based on the (visual) context, which of them is the appropriate one. In doing so, they have to perform a *reference-set* computation, which Reinhart (2006) argued to be rather taxing on working memory, especially that of children who, unlike adults, sometimes have problems with handling computations that involve two members in the reference set. Within the task which we used, one could assign a reading to the ambiguous relative only integrating syntax and the visual cues. But children seem to be unable to effectively integrate language and contextual cues in order to solve ambiguity, which prevents them from identifying the antecedent of the clitic and use this information in their comprehension of the relative.

5. CONCLUSIONS

The goal of this study has been to investigate whether there is a SR vs. DOR asymmetry in the comprehension of relatives in child Romanian and to identify the strategies which are used by children in the comprehension of DORs. The data revealed a SR vs. DOR asymmetry in comprehension for children, but not for adults. Since no child-adult asymmetry has been reported for the production of RCs in Romanian, and given the early emergence of both SRs and DORs in the longitudinal data, we argued that children know the syntax of right branching relatives very early. Following a long line of recent studies, we adopted the hypothesis that DORs are more difficult because they involve a long distance dependency which triggers memory overload. An important limitation of our own study is that we did not measure memory span in order to test the correlation between memory and target responses. However, results reported in other studies confirm that such a correlation exists (see, for example, Weighall and Altmann 2010, Arosio *et al.* 2011). In the case of DORs, failing to cope with a high memory load structure results in an “ambiguous dependency”. Though children know the syntax of relatives, they are less good at integrating language with extralinguistic context in order to solve ambiguity.

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That this account is on the right track is supported by the results in the comprehension of sentences with null and with overt subjects. Children across age groups use the lexical subject as a prop in the task. In this, they employ an important syntactic difference between DORs and SRs: only the former freely allow an overt lexical subject.

DORs with a lexical subject are not ambiguous, but for the immature child who may not be able to always hold both DPs in memory (the relative head and the subject) they may occasionally become ambiguous. The way in which children solve this problem is not indifferent to syntax. The data reveal not only early sensitivity to syntactic properties but also that the syntactic knowledge which children exploit varies with age. The younger subjects rely exclusively on the overt subject, with a preference for the one in pre-verbal position. When the subject is null, only the older children are able to exploit agreement features on the verb (uninterpretable features valued within a CP phase) to disambiguate the sentence. The older children are also the only ones who are able to exploit the gender features of the head and of the subject of the relative. Gender and number features are not used until the age of 6 in the comprehension of DORs.

When the subject of the relative clause is null and the *phi*-features on the verb are not different from those of the relative head, the DOR is ambiguous and children's responses are at chance. They cannot integrate the *phi*-features of the clitic and the visual context. The difficulty seems to be rooted in the computational overload of these sentences and in the immature capacity of children to integrate knowledge of syntax/morpho-syntax and contextual information effectively.

We believe that the experimental data presented in this paper corroborated by production results reported in previous studies indicate that syntactic properties are exploited early. Overt subjects are exploited very early, with focus/topic features being comprehension boosters. Information at the syntax-morphology or at the syntax-lexicon interfaces is exploited after the age of 6, when children are able to integrate this type of language knowledge with extralinguistic cues.

This is, we believe, a desirable account, in accordance with the view that children acquire the parameters of syntax early (Wexler 1998). The present study provides evidence for continuity throughout the language acquisition process. It is also in accord with the minimalist attempt at reducing what is attributed to UG "while still accounting for the variety of internal languages attained, relying on third-factor principles" (Chomsky 2009:26). Our data have revealed an intricate interaction between syntax and "third-factor principles", whose nature remains to be further investigated.

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