PRONOMINAL SUBJECT INTERPRETATION IN TEMPORAL ADJUNCTS IN CHILD ROMANIAN

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Abstract: The present paper reports the results of an experimental study[1] on the resolution of intra-sentential anaphora in child Romanian. In a picture-selection task, 3-, 5- and 8-year old monolingual Romanian children had to identify the matrix antecedent of 3rd person overt pronouns, null pronouns and demonstratives which were used as the subject in a temporal adjunct. The results showed that only 8-year-olds had adult-like antecedent preferences. At age 3 and at age 5, Romanian-speaking monolingual children do not distinguish between the discourse-pragmatics properties of overt and null 3rd person pronouns. With demonstratives, they have adult-like biases as early as age 3. This developmental asymmetry is accounted for in terms of the properties of the Romanian pronominal system, where overt pronominal subjects can occur in topic continuity contexts, on a par with null pronominal subjects. This overlap between the two types of pronominal subject can delay the identification of their discourse-pragmatics properties.

Keywords: intra-sentential anaphora, L1 Romanian, null pronominal subject, overt pronominal subject, demonstrative

1. Introduction

One common assumption with respect to the antecedent preferences for null and overt pronominal subjects in intra-sentential contexts is that the former preferentially take a prominent antecedent, whereas the latter take a less prominent one (Carminati 2002). These preferences have been shown, however, to be subject to cross-linguistic variation (Alonso-Ovalle et al. 2002, Filiaci 2011, Filiaci et al. 2013, Filiaci, Sorace, and Carreiras 2014). Such differences, as expected, are also reflected in the acquisition path. In some languages, antecedent preferences for null pronominal subjects are acquired earlier (see, e.g. Serratrice 2007, Sorace et al. 2009 for Italian, Kraš and Stipeć 2013 for Croatian). For other languages it has been reported that 5-year-olds have no clear preference for the antecedent of either null or overt pronominal subjects (e.g. for European Portuguese, Lobo and Silva 2015). The age at which adult-like preferences are attested may also differ from one language to another (e.g. Italian vs. Croatian, Kraš and Stipeć 2013). For Romanian, Teodorescu (2016) shows that 5-year-olds do not have adult-like preferences for either null or overt pronominal subjects. Their responses are almost equally divided between a subject and an object antecedent, irrespective of whether the pronominal subject is null or overt. Interestingly, in the case of demonstratives, the data reveal a weak object bias (58%), though not statistically significant. Extending the investigation to other age groups could shed light on the acquisition of the conditions governing the antecedent

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preferences of pronominal subjects in child Romanian. This is precisely the goal of the present paper. It investigates the interpretation of null and overt pronominal subjects in temporal adjuncts in child Romanian, with a focus on 3rd person null pronominal subjects, overt personal pronominal subjects and demonstratives.

The paper is organized as follows: Section 2 presents Carminati's (2002) Position of Antecedent Hypothesis (PAH) from a cross-linguistic perspective. The antecedent preferences of null and overt pronominal subjects in Romanian are briefly discussed in the second part of this section. The main findings reported in previous acquisition studies on antecedent preferences of null and overt subjects in null subject languages are summarized in Section 3. In Section 4 I present my own study on antecedent preferences of null and overt subjects in child Romanian. The main findings are summarized in Section 5.

2. Carminati's (2002) PAH and language variation

2.1 The hypothesis in a nutshell

Carminati (2002) looks into the antecedent preferences of null and overt subjects in intra-sentential contexts on the basis of experimental data. According to her Position of Antecedent Hypothesis (PAH) in intra-sentential anaphora contexts, null pronouns prefer the most prominent antecedent, which corresponds to the one occurring in the Specifier of IP, i.e. she assumes that prominence is syntactically determined. Overt pronouns prefer a less prominent antecedent (the one which occupies a position lower in the structure, e.g. the object position). For example, in (1a), the null subject will preferentially select *Maria*, which is in the Specifier of the Inflection Phrase (IP), as its antecedent; in (1b), the overt pronominal subject *lei* 'she' will preferentially take *Vanessa*, the DP in subject position, as its antecedent:

(1) a. **Maria$_{i}$** scriveva spesso a **Vanessa$_{j}$** quando **pro$_{i/(j)}$** era negli Stati Uniti.
b. **Maria$_{i}$** scriveva spesso a **Vanessa$_{j}$** quando **lei$_{(i)/j}$** era negli Stati Uniti.
'Maria often wrote to Vanessa when she was in the USA.'
(from Carminati 2002)

There are two important remarks one has to make in relation to this hypothesis. The first one is that it identifies a *preference*, and not a syntactic condition. This pattern builds on the interaction between the pragmatic properties of the anaphor (Ariel's 1990 Accessibility Hierarchy) and the syntactic position of the antecedent. The second one is that Carminati makes this generalization on the basis of data from Italian; she explicitly mentions that the PAH is likely to be subject to language variation. Indeed, several studies which investigated the PAH in other languages revealed that the preferences are not the same. In Greek, for example, null pronominal subjects preferentially choose a prominent antecedent and overt pronominal subjects choose a lower antecedent, as predicted by PAH (Papadopoulou et al. 2007, Tsimpli et al. 2003, 2004). The antecedent preference pattern in European Portuguese and in Catalan supports the hypothesis as well (Lobo and Silva 2014, Mayol 2010). But data from Spanish (Filiaci 2008) and Hebrew

(Meridor 2006) show that in these languages overt pronouns do not preferentially choose a less prominent antecedent; the choice is random in this case. Sometimes, for one and the same language different studies report different preferences. The cross-linguistic picture indicates that the null pronominal subject bias is the same across languages, but the overt pronominal subject bias is resolved differently, as can be seen in Table 1.

Table 1. Pronominal subjects: Object and subject biases across languages

Language	**Study**	**NPS**	**OPS**
Italian	Carminati (2002) Sorace and Filiaci (2006)	subject	object no bias
Catalan	Mayol (2010)	subject	object
Greek	Tsimpli et al. (2003, 2004)	subject	object
European Portuguese	Lobo and Silva (2014)	subject	object
Spanish	Alonso-Ovalle et al. (2002), Filiaci (2010), Filiaci et al. (2013), Garcia-Alcaraz and Bel (2014)	subject	object/ no bias
Hebrew		subject	no bias
Brazilian Portuguese		subject	no bias

2.2 PAH: The view from Romanian

Romanian is a *pro*-drop language (Dobrovie-Sorin 1994). Both null and overt pronominal subjects are allowed in finite clauses. The pre-verbal subject occurs, according to some studies, in [Spec IP], which is analysed as a non-argumental position. Within this analysis, the subject receives Nominative case in [Spec VP] and then moves to [Spec IP] when it has a topic feature to check (Dobrovie-Sorin 1994, Alboiu 2002). According to other studies, pre-verbal subjects (associated with a topic/focus feature) move to the left periphery of the clause, in the C-domain (Avram 1992, Cornilescu 2000). Irrespective of the details of these two main directions of analysis, they both place the pre-verbal subject in a position structurally higher than the object, i.e. the pre-verbal subject is structurally prominent.

According to Carminati's PAH, in a context like the one in (2), the null subject in the embedded clause will preferentially choose the DP in subject position in the matrix as its antecedent, whereas the overt pronominal subject in (3) will preferentially choose the lower DP in the matrix, i.e. the DP in object position. In (2) *pro* will be preferentially co-indexed with *elefantul* 'the elephant' and in (3) the overt pronominal subject *el* 'he' will be preferentially co-indexed with the direct object *motanul* 'the cat'.

(2) Elefantul$_i$ stropea motanul$_j$ în timp ce *pro*$_{i/(j)}$ mergea cu bicicleta.
elephant-the splashed cat-the in time what pro went with bicycle-the
'The elephant splashed the cat while it was riding the bicycle.'

(3) Elefantul$_i$ stropea motanul$_j$ în timp ce *el*$_{j/(i)}$ mergea cu bicicleta.
elephant-the splashed cat-the in time what he went with bicycle-the
'The elephant splashed the cat while it was riding the bicycle.'

Previous studies show that antecedent preferences in Romanian observe Carminati's PAH. Geber (2006) tested the hypothesis in contexts involving dative quirky subjects in main and subordinate clauses (in intra-sentential, subordinate and coordinate structures). The three experiments presented in the paper focus on: adverbial clauses involving a dative subject and a nominative object in the subordinate clause, complement clauses of report verbs when the subject of the subordinate clause is a dative subject and contexts with two coordinate clauses. Geber concludes that, in accordance with Carminati's PAH, the dative subject is associated with the null pronoun and the overt pronoun with the object.

In a replica of Carminati's (2002) study, Pagurschi (2010) tested antecedent preferences of null and overt pronominal subjects in Romanian in a variety of contexts. One of the tests investigated the interpretation of null and overt pronominal subjects in adverbial clauses (temporal and conditional) with two antecedents (of the same gender) in the main clause (Carminati's experiment 2), as in (2). I focus on the results obtained in this experiment, since it is similar to the one used in the present study. Pagurschi (2010) administered a 10 sentence written questionnaire (5 with temporal clauses and 5 with conditional clauses with two possible antecedents) to 42 native speakers of Romanian (age range 20-50 years). Her results support Carminati's (2002) hypothesis: 91.4% of the responses chose the subject in the main clause as the antecedent of a null subject. For overt pronominal subjects, 81.19% of the responses indicated the object in the main clause as a possible antecedent (Pagurschi 2002:77).

Avram and Teodorescu (2016) and Teodorescu (2016), on the other hand, present findings which confirm PAH only for the antecedent choice for null pronominal subjects. For overt pronominal subjects in temporal adjuncts, the adults in these two studies showed no bias. In Teodorescu (2016), the adults chose the subject 53.4% and the object 45.3% as the antecedent of an overt pronominal subject. The difference may be due to the different nature of the task. Pagurschi (2010) used a self-paced written questionnaire, whereas Teodorescu (2016) used a picture selection task (the one which I will also use in the present study), during which the participants had to choose the picture that matched the sentence when seeing two pictures on a monitor.

Several studies which investigated anaphora resolution in German, Dutch, Finnish and Hebrew show that when the subject in the embedded clause is a demonstrative pronoun, speakers have a clear bias towards less salient antecedents (Bosch et al. 2007, Kaiser and Trueswell 2004, 2008, *inter alia*). Though there is no study on antecedent preferences of demonstrative subjects in embedded clauses in Romanian, following what has been reported for other languages one can predict that in Romanian as well, the demonstrative in (4) will preferentially choose the object of the main clause as its antecedent:

(4) Elefantul$_i$ stropea motanul$_j$ în timp ce *acesta*$_{j/(i)}$ mergea cu bicicleta.
elephant-the splashed cat-the in time what this went with bicycle-the
'The elephant splashed the cat while this one was riding the bicycle.'

This would also be in accordance with Ariel's (1990) Accessibility Scale, on which both distal and proximal demonstratives occupy a position lower than null expressions and overt pronouns, i.e. demonstratives are lower accessibility markers:

(5) zero < […] < pronoun < […] < **demonstrativ**e < […]

For Romanian it has been argued that demonstratives have a low degree of accessibility (Giurgea 2010: 245). Therefore, in a context like the one in (6), the demonstrative in subject position in the adjunct clause will preferentially choose the DP in object position in the matrix (*Vasile*).

(6) **Ion**$_{i}$ l- a sunat pe **Vasile**$_{j}$ când **acesta**$_{j}$ era bolnav.
Ion him has called PE Vasile when this was sick
'Ion called Vasile when this one was sick.'

Strong pronouns choose less prominent antecedents and have the features [+hum]/[+person]. There are, however, contexts in which the use of a weak form is blocked. The only form which is allowed is no longer interpreted as strong, in which case it becomes compatible with a [–human] interpretation (see 7c).

(7) a. Ana nu a întrebat nimic despre Maria pentru că nu îi pasă de **EA**. [+hum]
'Ana did not ask anything about Maria because she does not care about her.'
b. *Nu a întrebat nimic despre carte pentru că nu îi pasă de **EA**. *[−hum]
'She did not ask anything about the book because she does not care about it.'
c. Nu a cumpărat maşina pentru că nu i-a plăcut nici ea, nici proprietarul ei. [−hum]
'He did not buy the car because he didn't like either it or its owner.'
(adapted from Giurgea 2010: 235)

Generally, in *pro*-drop languages, null pronominal subjects signal topic continuity and overt pronoun subjects signal topic shift or contrastive focus. Overt pronoun subjects have the feature [+switch reference]. This property is subject to cross-linguistic variation. In Italian, [+switch reference] is strong with overt pronoun subjects, which cannot be used in topic continuity contexts. In Spanish, on the other hand, [+switch reference] is weaker, which makes overt pronoun subjects more compatible in topic continuity contexts (Filiaci 2010). Romanian overt pronoun subjects can appear with topic continuity, which indicates that the [+switch reference] features are weak(er) (see Zafiu 2008 for a detailed description of anaphoric relations in Romanian). In (8) below *not* using an overt pronominal subject would be pragmatically odd:

(8) Cărtărescu a revoluţionat romanul românesc contemporan. **?(El)** a scris mai multe romane.
'Cărtărescu revolutionized the contemporary Romanian novel. **He** wrote several novels.'

The strong pronominal form is used without implying any contrast. It does not indicate topic shift or contrastive focus, but topic continuity, behaving like 'weak' pronouns. Such data show that overt pronouns in null subject languages do not have to be strong in all the contexts in which they occur. Some overt pronominal subjects behave like weak pronouns, being interpreted as *pro*. This is indeed the case in Romanian, where overt pronoun subjects have hybrid behaviour: they can be both weak and strong pronouns. In terms of acquisition, this might delay the identification of the discourse conditions under which an overt pronominal subject is licit in the target language.

3. Previous studies on the L1 acquisition of anaphora resolution

Most L1 acquisition studies report that preferences for null pronouns are adult-like early but they differ with respect to the acquisition of the interpretation of overt pronominal subjects. In some languages children have adult-like antecedent preferences for null pronominal subjects but not for overt pronominal subjects. For the latter they over-choose a subject antecedent. This has been shown for Italian (Serratrice 2007), Greek (Papadopoulou et al. 2014) and Basque (Iraola et al. 2014). Similar results were found in Croatian. Kraš et al. (2016) showed that 11-year-old Croatian monolinguals have adult-like preferences for the antecedent of null pronominal subjects but not for overt pronouns. The children showed a stronger preference for the matrix subject antecedent for the overt pronoun than the adults. The latter preferentially chose the object in this case. Similar results are reported in Kraš and Stipeć (2013), on the basis of the same picture selection task. The participants heard a sentence in which the subject in a temporal clause was a 3rd person null subject or an overt 3rd person pronoun and were required to select the picture which matched the sentence. The Croatian children showed an early adult-like antecedent choice pattern for null pronominal subjects (they opted for the matrix subject), but an overgeneralization of subject choice for overt pronouns; children up to the age of 11 show a weaker preference for the object when their choice is compared to that of adults.

For European Portuguese the results differ from one context to the other. Silva (2015) investigates null and overt pronominal subject interpretation in complement clauses. Her results are in line with previous studies, revealing adult-like anaphora resolution for null subjects but not for overt subjects. Lobo and Silva (2015) investigate antecedent choice for null and overt pronominal subjects in temporal adjuncts in both anaphoric and cataphoric contexts. According to their results 5-year-old monolingual speakers of European Portuguese do not distinguish between null and overt subjects with respect to antecedent choice. Children choose the subject as the preferred antecedent of null pronouns (though at a lower rate than adults) but they show no clear preference for the antecedent of overt pronouns. Teodorescu (2016) investigated Romanian children's antecedent preferences for null and overt pronouns when they are the subject in a temporal adjunct. The Romanian monolinguals (age range 3;11–5;11) did not have adult-like preferences for either null or overt pronominal subjects. In the null subject condition they chose the matrix subject as an antecedent 45% of the time and the matrix object 55% of the time. They showed no bias when the subject was an overt pronoun either. In this condition, the children took the matrix object as their antecedent 48% of the time and the

matrix subject 52% of the time. Unlike previous studies, Teodorescu (2016) also tested antecedent preferences for demonstratives. For this pronominal subject, the Romanian monolinguals showed a weak object bias (58%) which, however, did not reach statistic significance.

These results, according to which overt pronoun subjects may be difficult to acquire only in some languages, are in line with the variation which has been reported in adult grammars. Differences in antecedent preferences among adult systems are reflected in different acquisition routes. But the acquisition of the null – overt subject alternation involves knowledge of the properties of null pronominal subjects, of overt ones and of the division of labour between the two. Therefore, difficulties in the acquisition of overt pronominal subjects may also reflect unstable knowledge of the properties of null subjects and of the pronominal system in general.

4. Antecedent preferences of pronominal subjects in child Romanian

4.1 Aim

The present study investigates intra-sentential anaphora resolution in child Romanian. Following Teodorescu (2016), Avram and Teodorescu (2016) it also brings demonstrative subjects into the picture. It addresses the following questions: (i) how early are the Romanian children's antecedent preferences for null and overt pronominal subjects in an intra-sentential context adult-like?; (ii) is there a developmental difference between the acquisition of antecedent preferences for null and overt pronouns in child Romanian, as reported for other languages?; (iii) is there any developmental difference between antecedent preferences for demonstrative pronominal subjects and overt 3 person pronominal subjects?

4.2 Participants

92 monolingual Romanian children took part in the study. The younger ones attend a kindergarten in Bucharest. The 8-year-olds attend a primary school in the same city. The results of a group of 48 adults[2] were used for comparison. The details are summarized in Table 2.

Table 2. Participants

Group	Age range	Mean (SD)	Number
3-year-olds	3;1 – 4;11	3;11 (6.649)	31
5-year-olds	5;0 – 6;11	5;11 (7.553)	37
8-year olds	7;0 – 9;5	8;7 (7.406)	24
TOTAL	3;1 – 9;5		92
adult controls	19 – 68		48

[2] The results of the group of adults are those reported in Teodorescu (2016).

4.3 Task design and procedure

In order to answer these questions I used a binary picture selection task which included 5 warm up sentences, 12 experimental sentences and 3 control sentences. The task is the one used in Teodorescu (2016, 2017) and in Avram and Teodorescu (2016). It is similar to Carminati's (2002) experiment 2 and to the one used in Pagurschi (2010). Each test sentence contained a main clause, as in (9), and a temporal adverbial clause (a *while* clause), as in (10):

(9) Elefantul a stropit motanul ....
elephant-the has splashed cat-the
'The elephant splashed the cat ...'

(10) ... în timp ce mergea cu bicicleta.
in time what went with bicycle-the
'...while riding the bicycle.'

In all the test sentences both possible antecedents preceded the pronouns. The task included three conditions, with type of pronominal subject in the embedded clause as within-participant factor: (i) null pronominal subject; (ii) overt personal pronoun as subject; (iii) demonstrative pronoun as subject. The referents of the subject and of the object were all [+animate] and they performed non-specific pragmatically plausible activities. The subject in the embedded clause had the same *phi*-features (gender, number) as the possible antecedents, i.e. the subject and the object in the main clause.

Examples illustrating the three conditions are given in Table 3 below, which also includes the expected answers for null and overt pronominal subjects in accordance with Carminati's (2002) PAH and for demonstratives in accordance to various previous studies (see section 2). The full inventory of test sentences is given in the Appendix.

Table 3. Task design. Conditions and expected antecedent choice

Condition	**Expected bias**
Null subject Caracatița a văzut pisica în timp ce **pro** mergea cu bicicleta. octopus-the has seen cat-the in time what pro went with bicycle-the octopus saw the cat while riding the bicycle.'	matrix subject
Overt pronominal subject Caracatița a văzut pisica în timp ce **ea** mergea cu bicicleta. octopus-the has seen cat-the in time what she went with bicycle-the 'The octopus saw the cat while **she** was riding the bicycle.'	matrix object
Demonstrative Caracatița a văzut pisica în timp ce **aceasta** mergea cu bicicleta. octopus-the has seen cat-the in time what this went with bicycle-the 'The octopus saw the cat while **this one was** riding the bicycle.'	matrix object

The children were tested individually in a quiet room at their kindergarten or school. I used a power point presentation on a laptop. Each slide presented two pictures: in one picture the matrix subject was performing the action, in the other picture the matrix object was performing the action. The participants heard a sentence and were required to choose the appropriate picture. For example, for the test sentences in Table 3, the participants saw the two pictures in Figure 1 and they had to point to the one which they thought best matched the sentence.

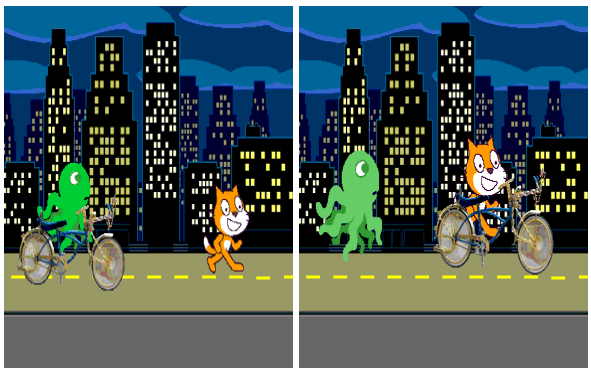

Figure 1. Example of pairs of pictures used in the task

4.4 Results

4.4.1 The 3-year-old group

For the 3-year-olds the results in the null pronominal subject condition are summarized in Figure 2 and those for overt pronominal subjects in Figure 3. In both figures the children's responses are compared to those of the group of adults.

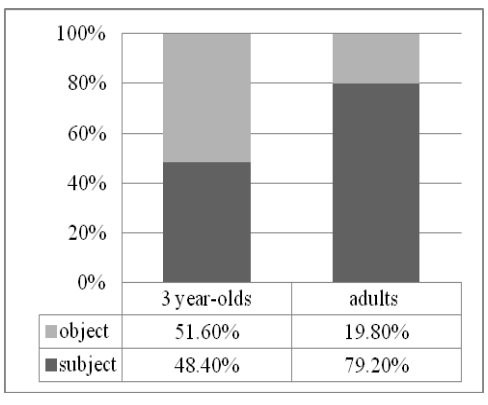

Figure 2. 3-year-olds.
Responses in the null subject condition

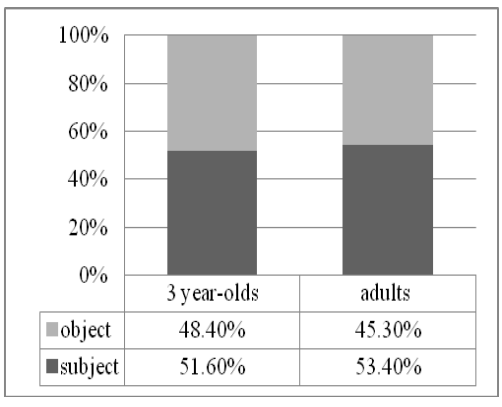

Figure 3. 3-year-olds.
Responses in the overt subject condition

The children did not show any bias in the null subject condition. A standard two-sample t-test at the alpha = .05 level was conducted to test for a difference in scores between their subject and object responses. It revealed no significant difference between response type (subject: M = 1.94, SD = 1.03; object: M = 2;06; SD = 1.93), t(30) = −.035, p = .73 (two-tailed). In other words, children randomly chose the matrix subject or the matrix object as the antecedent of a null pronominal subject in the temporal clause.

The adults preferentially chose the subject in the main clause as the antecedent of a null pronominal subject, in accordance with Carminati's hypothesis. In order to test for the difference in scores between matrix subject and matrix object responses a standard two-sample t-test at the alpha = .05 level was conducted. It revealed a significant difference between response type (subject: M = 3.17, SD = 0.88; object: M = 0.80; SD = 0.89), t(47) = 9.30 , p = .00 (two-tailed). This means that adults significantly chose the matrix subject as the antecedent of the null subject in the temporal clause.

Neither the 3-year-olds nor the adults in the control group showed any bias in the overt personal pronoun condition. The children did not show any bias (see Figure 2). A standard two-sample t-test at the alpha = .05 level was conducted to test for a difference in scores between subject and object responses in the overt personal pronoun subject condition. Children's responses showed no significant difference between response type (subject: M = 2.06, SD = 0.99; object M = 1.94; SD = 0.99) t(30) = 0.36, p = .72 (two-tailed). A standard two-sample t-test at the alpha = .05 level was conducted to test for a difference in scores between subject and object responses within the adult group. Their responses showed no significant difference between response type (subject: M = 2.1, SD = 1.6; object M = 1.8; SD = 1.5) t(47) = 0.93, p = .36 (two-tailed), i.e. with adults the ratio subject/object is not statistically different in the overt pronominal subject condition.

In the present study antecedent preferences for demonstratives have also been tested. The picture which emerges in this case is similar across 3-year-olds and adults. With the children the preference for the object in the main clause as the antecedent of the demonstrative subject in the temporal adjunct is obvious (62.1%) (see Figure 4). The adults also showed an obvious object bias (75%).

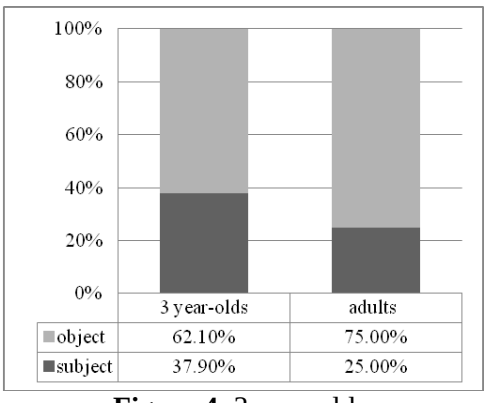

Figure 4. 3-year-olds.
Responses in the demonstrative subject condition

A standard two-sample t-test (alpha = .05 level) was used to test for the difference in scores between matrix subject and matrix object choice in the demonstrative subject condition. Children's responses showed a significant difference between response type (subject: M = 1.52, SD = 0.89; object M = 2.49; SD = 0.89) t(30) = −3.03, p = .005 (two-tailed). This difference indicates that when the subject in the temporal adjunct is a demonstrative 3-year-olds are relatively categorical in their choice.

A one-way ANOVA (repeated measures) was conducted to test for the effect of pronominal subject type on matrix antecedent choice. The number of the children's responses that chose the matrix subject as a possible antecedent differed significantly across conditions: F(2, 30) = 4.3, p = .02. Multiple t-tests with Bonferroni correction (significance is reported at 0.017 level) revealed that children's responses showed a significant difference between antecedent choice in the demonstrative condition (where they preferred the matrix object as an antecedent) and in the overt pronoun condition: t(30) = 2.97, p = .005 (two-tailed). At age 3, Romanian children do not make any significant difference in terms of antecedent choice between null and overt pronominal subjects.

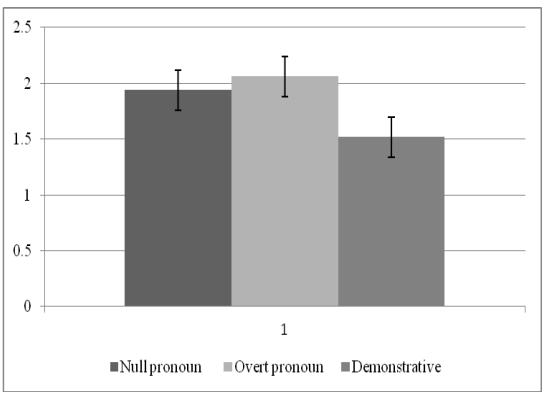

Figure 5. 3-year-old children.
Mean number of matrix subject antecedent choice responses in the three conditions[3]

A one-way ANOVA (repeated measures) at the alpha level of .05 was conducted to test for the effect of pronominal subject type on matrix subject antecedent choice within the adult group. The number of responses which chose the matrix subject as a possible antecedent differed significantly across conditions: F (2, 94) = 52.29, p = .00. Multiple t-tests with Bonferroni correction (significance is reported at 0.017 level) revealed that adults' responses showed a significant difference between responses in the null and in the overt pronominal subject conditions [t(47) = 4.41, p = .000 (two-tailed)], i.e. adults more frequently chose the matrix subject as an antecedent when the pronominal subject was null. They also chose the matrix subject as an antecedent more frequently when the subject was an overt pronoun than when it was a demonstrative: t(47) = 5.60, p = .000

[3] Error bars represent the standard error bars of the means.

(two-tailed). Adults treated the three pronominal subject types differently, but they did not preferentially choose the matrix object as the antecedent of overt pronominal subjects.

4.4.2 The 5-year-old group

For the 5-year-olds the results for null subjects are summarized in Figure 6, those for overt pronominal subjects in Figure 7 and for demonstratives in Figure 8. They are compared with the adults' results.

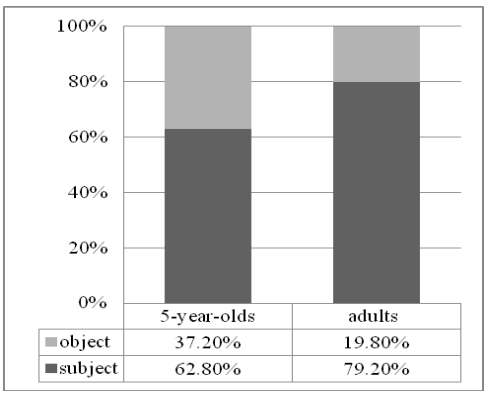

Fig. 6. 5-year-olds.
Responses in the null subject condition

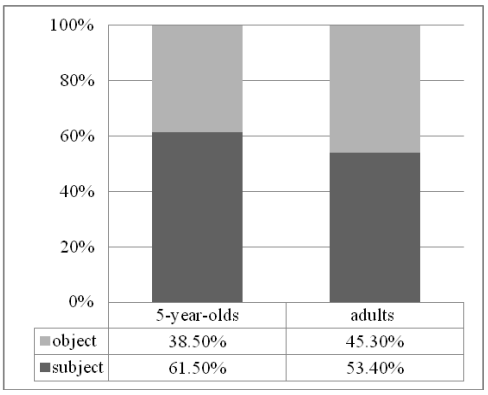

Fig. 7. 5-year-olds.
Responses in the overt pronoun condition

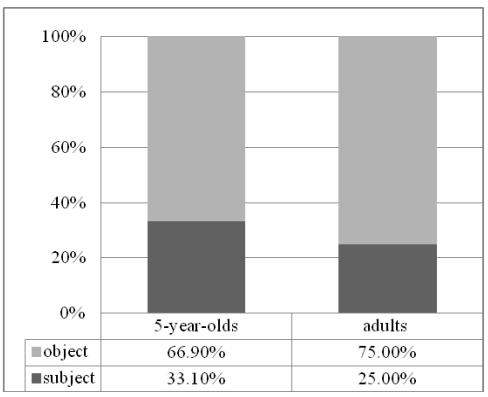

Fig. 8. 5-year-olds.
Responses in the demonstrative subject condition

The picture which emerges from the responses of this age group is different. Unlike the 3-year-old group the 5-year-olds show a bias for the matrix subject in the null pronominal subject condition. A standard two-sample t-test at the alpha = .05 level was conducted to test for a difference in scores between subject and object responses within the group in the null pronominal subject condition. Their responses showed a significant difference between antecedent choice (subject: M = 2.51, SD = 1.46; object M = 1.49;

SD = 1.46): t(36) = 2.13, p = .04 (two-tailed). A second standard two-sample t-test at the alpha = .05 level was conducted to test for a difference in scores between subject and object responses within the 5-year-old group in the overt pronominal subject condition. The higher percentage of the responses with a subject shows a preference for the matrix subject as the antecedent of the overt pronominal subject. The difference between the responses in this condition reaches significance, as proved by a standard two-sample t-test at the alpha = .05 level. The difference between the responses in which the matrix subject was the antecedent (M = 2.46, SD = 1.37) and those in which the matrix object was the antecedent (M = 1.54, SD = 1.37) is significant: t(36) = 2.04, p = .04 (two-tailed). In the demonstrative condition, there is an obvious object bias. The difference between subject and object responses is significant, as shown by the results of a standard two-sample t-test at the alpha = .05 level: t(36) = −3.29, p = .002 (two-tailed).

A one-way ANOVA (repeated measures) was conducted to test for the effect of pronominal subject type on matrix subject antecedent choice within the 5-year-old group. The number of responses which took the matrix subject as a possible antecedent differed significantly across conditions: F(2, 72) = 9.64, p = .000. Multiple t-tests with Bonferroni correction (significance is reported at 0.017 level) revealed that the 5-year-olds showed a higher preference for a subject antecedent in the overt pronoun condition than in the demonstrative subject condition: t(36) = 3.42, p = .001. The comparison between the null and the overt pronoun subject condition (t(36) = 0.18, p = .85 (two-tailed)) does not reach significance.

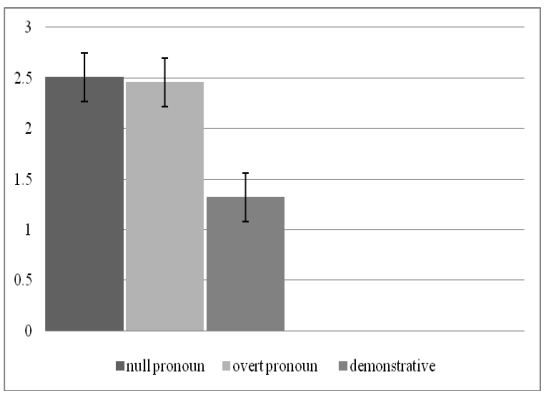

Figure 9. 5-year-olds.
Mean number of matrix subject antecedent choice responses in the three conditions

4.4.3 The 8-year-old group

The response biases of the 8-year-old children are adult-like. For the null subject condition, the subject bias is very strong (Figure 10), as confirmed by a standard t-test: t(23) = 6.19, p = .000 (two-tailed), which reveals a statistical difference between subject responses (M = 3.25, SD = 0.98), which are more numerous, and objet responses (M = 0.75, SD = 0.98).

Unlike the 5-year-olds but like the group of adults, the 8-year-olds do not show any bias for the antecedent of overt pronominal subjects (Figure 11).Though the rate of matrix subject responses is slightly higher than the one of matrix object responses, the result of a two-sample t-test (alpha = .05 level) shows that the difference between subject (M = 2.33, SD = 1.40) and object responses (M = 1.67, SD = 1.40) does not reach significance: t(23) = 1.16, p = .26 (two-tailed).

For antecedent choice when the subject in the temporal clause is a demonstrative the results of the 8-year-old group are almost identical to those of the adult group (Figure 10). A standard two-sample t-test (alpha = .05 level) was used to test for the difference in scores between matrix subject and matrix object choice in the demonstrative condition. Children's responses showed an obvious object bias (subject: M = 1.08, SD = 1.44; object M = 2.92; SD = 1.44): t(23) = −3.11, p = .005 (two-tailed). This difference indicates that when the subject in the temporal adjunct is a demonstrative 8-year-olds are categorical in their choice.

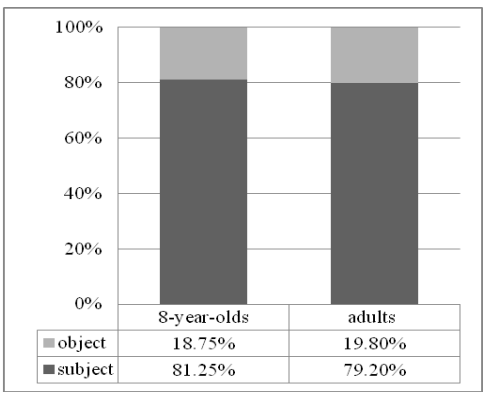

Figure 10. 8-year-olds.
Responses in the null subject condition

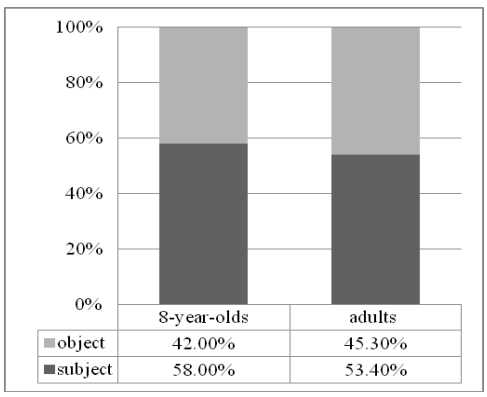

Figure 11. 8-year-olds.
Responses in the overt pronoun condition

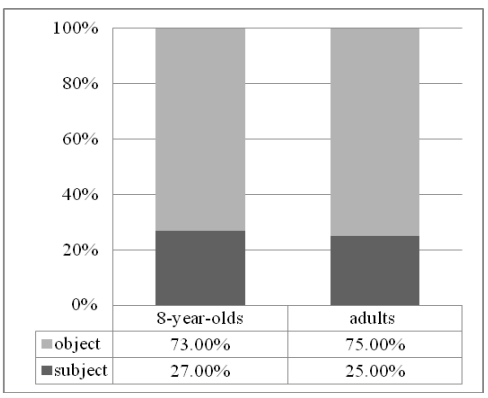

Figure 12. 8-year-olds.
Responses in the demonstrative subject condition

The 8-year-olds show adult-like sensitivity to pronominal subject type. A one-way ANOVA (repeated measures) at the alpha level of .05 tested for the effect of pronominal subject type on matrix subject antecedent choice within the 8-year-old group. The number of responses which took the matrix subject as a possible antecedent differed significantly across conditions: $F(2,46) = 17.99$, $p = .00$. In order to identify the source of the difference, multiple t-tests with Bonferroni correction (significance is reported at a .017 level) were conducted. They revealed that the children gave more subject responses in the null pronominal subject condition ($M = 3.25$, $SD = 0.98$) than in the overt pronominal subject condition ($M = 2.33$, $SD = 0.29$): $t(23) = 28$, $p = .008$. The difference between the responses in the overt pronoun condition ($M = 2.33$, $SD = 1.40$) and the demonstrative condition ($M = 1.08$, $SD = 1.44$) also reaches significance: $t(23) = 3.16$, $p = .004$.

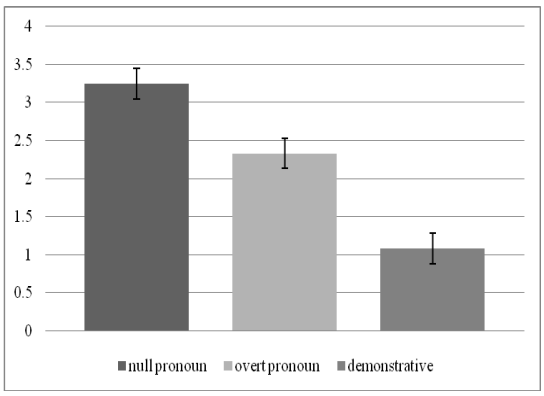

Figure 13. 8-year-old children.
Mean number of matrix subject antecedent choice responses for the three condition

4.5 Discussion

The present experimental data revealed that Romanian adults show a "DP in subject position" bias with null pronominal subjects, as predicted by Carminati's (2002) hypothesis. But they do not support the prediction of the same hypothesis with respect to overt pronominal subjects. The adults did not preferentially choose the less salient antecedent in this condition. In this respect, my results differ from those reported in Pagurschi (2010). This difference may be due to a task effect (see Teodorescu 2016 for a similar point of view). In the experiment used in the present study, the participants had to choose the appropriate picture which matched the sentence when seeing two pictures on the monitor. Pagurschi (2010) used a self-paced written questionnaire. Because the task in this study was the same for children and adults, I will compare children's responses only to those of the adults' responses in the present study.

The first question which I addressed was how early are the Romanian children's antecedent preferences for null and overt pronominal subjects in an intra-sentential context adult-like. The results revealed an obvious delay. Only the 8-year-old group showed the same antecedent biases for all the pronominal subjects investigated: null

pronouns, overt personal pronouns and demonstratives. The results also revealed a developmental asymmetry between the acquisition of antecedent preferences for demonstratives, on the one hand, and null and overt personal pronouns on the other hand. Romanian 3-year-olds show an adult-like preference only with demonstratives, with which they have an object bias. These findings differ from those in Teodorescu (2016), where the difference between the responses which took the matrix subject and those which took the matrix object as the antecedent of a demonstrative subject in a temporal clause did not reach significance. But even in that study, the data indicated a slight preference for the matrix object antecedent (58%). Demonstratives are the least vulnerable. At age 3, Romanian children already show an adult-like bias (though weaker) in the choice of the antecedent of demonstratives. But, at this age, they do not distinguish between null and overt pronominal subjects yet. Antecedent choice is random with null pronominal subjects and also with overt pronouns. At first sight, their antecedent choice preferences in the case of overt pronominal subjects seem to be adult-like (i.e. no bias). But the *at chance* pattern in both the null subject and in the overt pronoun conditions, as well as the results obtained with the 5-year-old group suggest that the "no bias" response pattern is not adult-like; it is, most probably, an instance of developmental optionality. It is therefore plausible to assume that Romanian 3-year-olds do not make a distinction in terms of antecedent choice between null and overt pronominal subjects. These findings reflect a delay in the acquisition of the difference between these two types of pronominal subject. At age 5, Romanian children have a subject bias with null pronominal subjects. But they also have a subject bias with overt pronominal subjects, unlike Romanian adults, who show no bias with overt pronominal subjects. The 5-year-olds treat null and overt pronominal subjects as having similar antecedent preferences. The children preferentially take the matrix subject, i.e. the most prominent DP, as an antecedent in both cases. At age 5 the fine-grained difference between overt and null pronominal subjects is not adult-like yet. The fine-grained differences are acquired sometime in between the age of 5 and the age of 8. The results of the 8-year-old group are almost identical to those of the adults: strong subject bias with null pronominal subjects, strong object bias with demonstratives and no obvious bias with overt pronouns. The results for the three age groups are compared in Table 3.

Table 3. Results. Antecedent preferences of children and adults

Group	Null subject	Overt pronominal subject	Demonstrative subject
3-year-olds	no bias	no bias	object bias
5-year-olds	subject bias	subject bias	object bias
8-year-olds	subject bias	no bias	object bias
Adults	subject bias	no bias	object bias

As the data in Table 3 show, children go through 3 stages with respect to pronominal subject antecedent choice: (i) at age 3, their choice is adult-like only when the subject is a demonstrative pronoun. They show no subject/object bias for either null or overt pronominal subjects; (ii) at age 5, they show a subject bias for both null and overt

pronominal subjects, i.e. they treat the two as having the same antecedent preferences; (iii) at age 8 their subject antecedent biases are adult-like.

The results of the present study are similar to the data reported for European Portuguese in Lobo and Silva (2015) for null and overt pronominal subjects[4]. These authors show that 5-year-old European Portuguese speaking children do not distinguish between null and overt pronominal subjects either. They account for their findings in terms of processing demands. Indeed, given the fact that children acquiring null subject languages start using subjects target-like very early, the cause of the observed delay cannot be syntactic in nature. Other studies, however, reveal a delay only with respect to overt pronominal subjects.

For Romanian, the previous studies which investigated the acquisition of the null subject parameter show that children set the value of this parameter very early in both L1 (Avram and Coene 2008, 2010, Teodorescu 2014a, 2014b, this issue) and 2L1 (Tomescu this issue). Their non adult-like subject antecedent preferences cannot, therefore, indicate a syntactic deficit. As mentioned in Section 2.2, in Romanian overt pronominal subjects do not always signal topic shift; they can occur in contexts of topic continuity, on a par with null pronouns. The [+switch reference] feature is weak in Romanian, where there is an overlap between null and overt pronominal subjects. Both can occur in contexts of topic continuity, which ban overt pronouns in other languages. This overlap could explain the delay that was found in the present study. The fact that at age 5, when the demonstrative is already categorically associated with the matrix object, the children preferentially took the matrix subject as the antecedent of both null and overt pronominal subjects suggests that they initially hypothesize that these pronouns, when used as subjects, have the same discourse properties.

5. Conclusions

The study presented in this paper showed that Romanian children resolve intra-sentential anaphora in an adult-like manner late, around age 8. The results also revealed an obvious difference between children's antecedent preferences for demonstrative subjects, on the one hand, and null and overt pronominal subjects, on the other. It is only the acquisition of anaphora resolution with the latter which is delayed. With demonstratives, Romanian children have adult-like biases as early as age 3. I accounted for this difference in terms of language-specific properties. In Romanian there is an overlap between overt and null pronouns in topic continuity contexts, i.e. the overt pronouns are not always specified for topic shift. This overlap can cause a delay in the identification of the discourse-pragmatics properties of these two types of pronoun, which children treat as similar during the early stages. The findings indicate that the acquisition of anaphora resolution is delayed when the discourse pragmatics properties of null and overt pronouns are not sufficiently different. This difference is subject to cross-linguistic variation and it interferes with PAH. In Romanian, where the difference between the two pronoun types is not obvious enough, there is no object bias for overt pronominal subjects

[4] They do not investigate antecedent preferences for demonstrative subjects.

(differently from what PAH would predict) and there is a delay in the acquisition of the antecedent preferences of null and overt pronominal subjects. This correlation, however, awaits confirmation from cross-linguistic investigation.

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Annex 1. Anaphora resolution. List of test items.

Condition	Sentences
Null pronominal subject	Elefantul a stropit motanul în timp ce **pro** mergea cu bicicleta elephant-the has splashed cat-the in time what pro went with bicycle-the 'The elephant splashed the cat while riding the bicycle.' Vrăjitoarea a văzut pisica în timp ce **pro** era pe mătură. witch.the has seen cat-the in time what pro was on broom 'The witch saw the cat while riding the broom.' Rața a pictat pisica în timp ce **pro** mânca o banană. duck-the has painted cat-the in time what pro ate a banana 'The duck painted the cat while eating a banana.' Câinele a auzit calul în timp ce **pro** bătea la tobe. dog-the has heard horse-the in time what pro beat at drums 'The dog heard the horse while beating the drums.'
Overt pronominal subject	Rața a pictat pisica în timp ce **ea** mânca o banană. duck-the has painted cat-the in time what she ate a banana 'The duck painted the cat while she was eating a banana.' Caracatița a văzut pisica în timp ce **ea** mergea cu bicicleta. octopus-the has seen cat-the in time what she went with bicycle-the 'The octopus saw the cat while she was riding the bicycle.' Vrăjitoarea a văzut pisica în timp ce **ea** era pe mătură. witch-the has seen cat-the in time what she was on broom 'The witch saw the cat while she was riding the broom.' Elefantul a stropit motanul în timp ce **el** mergea cu bicicleta. elephant-the has splashed cat-the in time what he went with bicycle-the 'The elephant splashed the cat while he was riding the bicycle.'
Demonstrative pronominal subject	Câinele a auzit calul în timp ce **acesta** bătea la tobe. dog-the has heard horse-the in time what this beat at drums 'The dog heard the horse while this one was beating the drums.' Vrăjitoarea a văzut pisica în timp ce **aceasta** era pe mătură. witch-the has seen cat-the in time what this was on broom 'The witch saw the cat while this one was riding the broom.' Elefantul a stropit motanul în timp ce **pro** mergea cu bicicleta. Elephant-the has splashed cat-the in time what pro went with bicycle-the 'The elephant splashed the cat while this one was riding the bicycle.' Rața a pictat pisica în timp ce **aceasta** mânca o banană. duck-the has painted cat-the in time what this ate a banana 'The duck painted the cat while **this one** was eating a banana.'
TOTAL	**12 test items**