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***On the Acquisition of Italian Restrictive Relative Clauses
in Typical and Atypical Development***

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INTRODUCTION

A pilot experiment on Italian acquisition: a set of elicited production tasks on different syntactic structures

From May 2011 to May 2012, I participated to an FSE granted project entitled “Elaborazione di nuovi strumenti testistici per la valutazione delle disabilità linguistiche in Veneto” (“Elaboration of new linguistic tasks to evaluate language disabilities in Veneto”), cod. 2120/1/8/1102/2010, held at the Department of Linguistics and Comparative Cultural Studies of the Ca’ Foscari University of Venice. The project aimed at elaborating a set of elicitation tasks on the acquisition of specific syntactic structures, namely restrictive relative clauses, cleft sentences, direct subject/object wh-questions, and passive sentences. The elicitation test was conceived as an important linguistic tool to use both in acquisition studies on Italian and in clinical field, in order to analyze the production of complex syntactic structures by Italian-speaking typically and atypically developing children.

Indeed, while Italian children’s abilities in comprehension are usually assessed using standardized tests as the TCGB, *Test di Comprensione Grammaticale per Bambini* (Chilosi & Cipriani, 1995), the TROG-2, *Test for Reception of Grammar* (Bishop, 2003; adapted for Italian by Suraniti et al., 2009) and the TNP, *Test Neuropsicologico Prescolare* (Cossu & Paris, 2007), Italian clinical centres presently lack standardized diagnostic tools evaluating children production of morpho-syntactic problematic structures. There are some tests eliciting sentence imitation, like the *Test di ripetizione di frasi* (De Vescovi and Caselli, 2001, 2007) for children aged 2-4. However, it principally aims at verifying the use of the working memory by presenting sentences of different complexity, which is measured with the length of the sentence and the number of arguments, but not with other important factors indicating syntactic complexity such as the type of syntactic movement involved and the assignment of thematic roles. Recently, Marini and Carlomagno (2004) have elaborated a task eliciting the narration of stories with the presentation of pictures to the child. Nevertheless, the morpho-syntactic abilities are evaluated by measuring the length of the sentences, the presence of grammatical utterances and paragrammatic production, whereas the authors do not consider the type of sentences produced. Finally, there is a test created by Cossu and Paris (2007), included in the TNP, which

is the only one investigating children's morpho-syntactic abilities with an elicitation procedure based on Crain and Thornton's (1998) suggestions. The experimenter has to move some toys in a very specific scenario and the child has to describe the actions acted out by the toys. However, the problem of this test is that it is composed of only 6 items and is thought for children up to 6,5 years.

With our set of tasks, we aimed at eliciting specific syntactic structures of different complexity. The task, designed both for typical and atypical populations, was divided in three sessions: in the first one, we elicited subject/object clefts and passive sentences; in the second one, we elicited subject/object restrictive relative clauses and direct subject/object wh-questions, while in the last session we asked the child to imitate the targeted object clefts, object relative clauses and passive sentences.

In this dissertation, I will focus on the elicited production and imitation of subject and object restrictive relative clauses across different populations: 116 typically developing children, 7 children with a diagnosis of dyslexia and 7 children with "suspected dyslexia", that is with consistent school difficulties reported by their teachers but without a diagnosis of dyslexia, and finally a control group of 10 adults.

The thesis is organized as follows. Chapter 1 explains the main characteristics and advantages of the experimental techniques used to elicit relative clauses: the *elicited production* and *sentence repetition tasks*. It also presents the properties of the structures targeted in our experiment: subject and object restrictive relative clauses. It explains how these structures are interpreted by generative grammar, through the *matching* and *head raising analysis*. The reader is also introduced into the debate on the acquisition of restrictive relative clauses across languages, both in typical and atypical development. Finally, two different accounts for the well known subject/object asymmetry are provided: De Vincenzi's (1991) Minimal Chain principle and Friedmann, Belletti and Rizzi's (2009) Relativized Minimality.

Chapter 2 presents the main characteristics of developmental dyslexia (DD) and its implications for acquisition. The most accepted linguistic accounts for DD are provided, included some recent studies on Italian (Cardinaletti and Volpato, 2011; Guasti, 2013; Zachou et al., 2012), investigating syntactic deficits in comprehension and production in dyslexic children.

Chapter 3 describes the structure and procedures of the elicitation and the repetition tasks, offering a comparison with previous experiment on Italian which

used Novogrodsky and Friedmann's (2006) Preference Task to elicit relative clauses (Utzeri, 2006; Volpato, 2010; Contemori, 2011). Two task modifications are presented, together with the relevant expectations (we hoped to collect a higher number of object relatives and more headed relative clauses).

Chapter 4 presents the scores reported by TD and non TD children and the control group of adults, including new linguistic data on the status of the relative head and some syntactic asymmetries found between gap and resumptive object relatives regarding the nature of the relative head and the distribution of embedded subjects. Differences in the production of relative clauses by typically and atypically developing children are also described, offering new linguistic data on the acquisition of Italian restrictive relative clauses by dyslexic/suspected dyslexic children.

The results are finally discussed in chapter 5: first, we compared our results with previous experiment on the production of Italian restrictive relative clauses (Guasti & Cardinaletti, 2003; Utzeri, 2006; Volpato, 2010; Contemori, 2011), underlying the possible advantages offered by the task modifications introduced in our experiment. Then, the discussion mainly concentrates on the asymmetries found between gap and resumptive ORs regarding the status of the head (demonstrative pronoun *quello*/lexical DP) and the position of embedded subjects (preverbal/post-verbal) in object relatives. A proposal for young children's preference for light headed relative clauses is also given. The different patterns detected in the production and repetition of subject and object relative clauses by typically and atypically developing children are finally compared to similar results presented in previous studies on syntactic deficits in SLI (Jakubowicz, Nash, Rigaut, Gerard, 1998; Novogrodsky and Friedmann, 2006; Stavrakaki, 2002; Contemori and Garraffa, 2010) and hearing-impaired children (Friedmann et al., 2008; Volpato, 2010).

In chapter 6, the final conclusions of our experimental work are presented.

CHAPTER I

I.I Why the elicited production task

Elicited production is an experimental technique designed in order to have the child produce a specific syntactic structure. The target sentences are elicited in the context of a game, usually using a puppet with whom the child interacts. The game is designed in order to associate each target syntactic structure with a situation which has to be uniquely felicitous for the production of the sentence type under investigation. The utterance must be elicited following a lead-in statement told by the experimenter, who has to provide the context and the instructions for the production of the target sentence, without saying it.

According to Crain and Thornton (1998), the elicited production technique is more suitable than other research methods, since it presents several advantages: first of all, it enables the experimenter to control the meaning associate to the target sentence, by creating a particular scenario, where some puppets are acting out and the experimenter is giving specific instructions to the child. Controlling the meaning allows to correctly interpret the sentences produced by the child. Indeed, experimenters usually encounter some difficulties in interpreting children's utterances, a problem which becomes much more consistent when analyzing spontaneous speech production.

Another virtue of the task is that it enables experimenters to collect linguistic data about syntactic structures normally avoided by children and adults in spontaneous speech because of their complexity or lack in the input. Indeed, children tend to use structures that are frequent in the input and avoid those which have been already acquired but are more difficult to compute. With the words of Crain & Thornton (1998: 141), "many linguistic phenomena of theoretical interest are only sparsely represented in the transcripts of children's spontaneous production, if they appear at all. Presumably, these complex linguistic forms are scarce because the situations that call for particular linguistic constructions occur only rarely in children's experience".

Another important aspect of the elicitation technique is that it allows researchers to gather linguistic data on the targeted structure in a single experimental session, or in a few weeks, avoiding the problem to collect data in a long period of time. With

the words of Thornton (1996: 79), “sufficient data can be collected to draw solid conclusions about the child’s grammar at a particular point in time. By contrast, in database searches of transcripts from children’s spontaneous speech, this is often not possible. In order to collect a sufficient data sample, researchers frequently have to search files that cover months or years, leaving open the possibility that important grammatical stages are obscured”.

However, as pointed out by Ferreiro et al. (1976), the problem of the elicitation technique is finding a uniquely appropriate context for the structure under investigation. According to the authors, in experimental situations eliciting linguistic forms, “we come up against an obstacle that is due to the nature of language itself; how to construct a situation that will obligatorily give rise to a certain sentence pattern? No such situations exist: thanks to the very rules that make language what it is, perfectly adequate and grammatically correct descriptions in many different forms can be given for any event or situation” (Ferreiro et al., 1976: 231).

Nevertheless, after Crain & Thornton’s (1998) pioneering work, studies on language acquisition using the elicitation technique have been constantly increasing. The authors strongly recommend to identify the uniquely appropriate situation for the investigated sentence type: experimenters have to create a scenario which will only elicit the target sentence. Indeed, children are more sensitive to pragmatics than adults and may experience some difficulties if the task is not provided with the right context. Young children (3, 4, and 5 years old) cannot understand utterances produced in an infelicitous or “null context”, which does not satisfy the pragmatic “felicity conditions”. The explication given by Hamburger and Crain (1982) is that grammar is acquired by children with <sentence; meaning> pairs; grammatical forms cannot be acquired and are difficult to understand without their associated meanings. The ability to understand sentences out of context is acquired later by children, when they have more practical knowledge of the rules of the conversation.

Since the elicitation task requires the child to produce uncommon and usually avoided syntactic structures, it is recommended to achieve the optimal level of comfort in the experimental session and to involve him/her as in a game. Therefore, the experimenters should know the child subjects well before beginning the experiment, and should use a puppet to capture his/her attention, giving him/her a reason to communicate with it. Indeed, children usually prefer to talk with a puppet than an adult, even if they know that an adult is acting out, and besides the puppet is

the one who engages them between trials, tells jokes and entertains them between different tasks; in other words, it makes the experimental session more pleasing and funny.

Finally, another important suggestion given by Crain and Thornton (1998) is not to frustrate the child when they are struggling to produce the target structure, with long silences or too many invitations to make another attempt.

To elaborate our elicited production task, we followed Crain and Thornton's (1998) suggestions to create the uniquely felicitous context for the sentence types under investigation and to involve children in the experimental sessions. We made use of puppets, which were tape-recorded and also acted out on the stage during the experiment. Children had to interact with them, and when the puppets did right, they gave them some awards, like stickers or food. Many children were enthusiastic, first of all the younger ones, and often asked to talk to the puppets even outside the experimental sessions. This device was fundamental not only because children were involved in the experiment as in a game; it also drew their attention on the task during the whole experimental practice and made it possible that children wanted to participate to the second session in order to complete the task. Moreover, we tried not to frustrate the child with too many attempts; if also the second effort was not effective, we went on with the experiment pretending that they had done right. For the same reason, we introduced some fillers eliciting unrelated simpler sentence types, in order to encourage the child with success experience.

I.II. Why the repetition task

We included the repetition task in our experiment for a cross-modality comparison with elicitation results. Sentence repetition is widely attested in research on language acquisition and several studies have shown its utility in assessing children's linguistic abilities across different populations (for TD children: Friedmann & Lavi, 2006; Chiat & Roy, 2008; Devescovi & Caselli, 2007; Seef-Gabriel et al., 2008; 2010; Contemori, 2011; Costa & Friedmann, 2012; for SLI: Conti-Ramdsen, et al., 2001, Contemori and Garraffa, 2010).

The assumption is that if the child can correctly reproduce the full sentence structure, we can infer that he/she has the cognitive structure and the grammatical competence required to produce that sentence model. According to many authors studying language acquisition (Friedmann and Lavi, 2006; Friedmann, 2007; Lust, Flynn and Foley, 1996; Costa & Friedmann, 2012), a child repeating a sentence is not merely reproducing, but reconstructing it. As pointed out by Costa & Friedmann (2012), "speakers of a language cannot repeat a sentence in their native language as a simple auditory string". Language processing is required in a task eliciting the repetition of a sentence, and therefore problems in comprehension and production manifest themselves in difficulties to repeat the targeted structure. According to the authors, consistent errors in repeating a certain sentence type and a good performance in the control ones indicate that the problematic structure has not been acquired yet. "When we compare structures that are similar in all respects (same length and words) and differ only in the relevant syntactic feature tested, then if a participant repeats well one structure but fails to repeat the other structure, this might indicate a specific difficulty with the tested structure, in our case, it might indicate that the first structure has been acquired, but not the second" (Costa & Friedmann, 2012: 14).

According to Lust, Flynn and Foley (1996: 56), "imitation of new, complex behavior appears to wait until the child mind has developed the "cognitive structure" required for generation of the behavior". The authors make the example of newborns, who can initially imitate simple tongue protrusion of their own repertoire, but can't imitate new tongue movements they do not have the competence for, as reported by Piaget (1968). Therefore, "imitation is not a simple copy, but a reconstruction of the stimulus" (Lust, Flynn and Foley, 1996: 56). In the area of language development,

similar findings are reported: for instance, in spontaneous speech production, children can imitate only structures which are part of their linguistic competence (Bloom, Hood, and Lightbown, 1974).

Evidence for reconstruction of the model sentence is provided by early studies using the repetition task: in the following examples (1-2), taken from Slobin and Welsh (1973), and quoted in Lust, Lynn and Foley (1996), it is clear that the child is not passively copying the sentence, but rather analyzing syntactic factors independently from semantic ones:

(1) *Adult* The red beads (\emptyset) and brown beads are here.

Child Brown beads here an' a red beads here. (2;3;3)

(2) *Adult* The owl eats candy and (\emptyset) runs fast.

Child Owl eat candy...owl eat the candy and...he run fast. (2;4;3)

Such reconstructing effects show that child is isolating syntactic factors from semantic and lexical ones, probably at the expense of semantic factors, as illustrated in the example (3), taken from Slobin and Welsh (1973):

(3) *Adult* Mozart got burned and the big shoe is here.

Child Mozart got burned an-duh...big shoe got burned.

The advantages of using a repetition task to test the child's linguistic competence, is that it provides direct evidence of the child's ability to reconstruct a particular aspect of grammar in a highly focused way. Therefore, "the researcher can make direct inferences from the child's utterance regarding particular aspects of syntactic competence, allowing precise comparison between adult and child syntax. [...] It is especially suitable when the researcher is led by specific, focused theoretical hypotheses" (Lust, Flynn and Foley, 1996).

In order to devise a felicitous repetition task, we decided to include a relevant context for each sentence type, as suggested by Crain and Thornton (1998). Children were told that a puppet has done the same game they had just finished (the whole elicitation test) and now they had to repeat what they heard. For each sentence, they saw the relevant pictures in the screen. This device provided them with a context,

helping them to retrieve the referents of the NPs and the whole meaning of the utterance.

Totally, children had to repeat 37 sentences: 8 passive sentences, 12 object cleft sentences, 12 object relative clauses and 5 fillers. The target sentences were the same of the elicitation task, with the exception of the target subject cleft sentences, subject relative clauses and wh-questions. Children were tested in a quiet room at school. No time limit was given during testing, and no feedback was provided by the experimenters.

I.III Syntactic interpretations of restrictive relative clauses

I.III.I *The matching and head raising analysis*

The type of relative clauses investigated in this study are subject and object restrictive relative clauses, which are subordinate clauses modifying a nominal element. By modifying the antecedent, which is the head of the RC, they limit and select the number of possible referents for it. Restrictive RCs are selected by a DP and belong to the syntactic category named CP (Vergnaud, 1974; Bianchi, 1999, a. o.).

In Italian, they are introduced by the complementizer *che* (English *that*), and contain a gap in the original position of the element which has been relativized. They are categorized into subject and object RCs according to the position from which the nominal element moves outside the clause, to become the head of the RC. In subject relative clauses, the element moves from the subject position, whereas in object relative clauses it moves from the object position within the VP. Consider examples (1) and (2) of Italian subject and object relative clauses, respectively.

(1) La mamma_i [che t_i bacia le bambine].

The mother_i [that t_i is kissing the girls].

(2) L'elefante_i [che (i papà) sollevano (i papà) t_i].

The elephant_i [that (the fathers) are lifting up (the fathers) t_i].

The syntactic interpretation of relative clauses has been the subject of a long-standing debate (Chomsky, 1965, 1977; Lees, 1960, 1961; Brame, 1968; Schachter, 1973; Vergnaud, 1974; Carlson, 1977; Kayne, 1994; Borsley 1997; Grosu and Landman 1998; Bianchi, 1999, 2000; Sauerland, 1998, 2000, 2003). Consider the example in (3), taken from Sauerland (2000: 1). “The question is whether the head of the relative clause - *the tigers* - stands in a transformational relationship to the relative clause internal argument position occupied by a trace” (Sauerland, 2000: 1).

(3) The tigers that I saw *t* at Ueno were cute.
head (NP) relative clause

Both interpretations, that there is a transformational relation and that there isn't, have been supported by linguistic research: the Matching analysis (Lees, 1960, 1961; Chomsky, 1965; Carlson, 1977; Sauerland, 1998) postulates that an internal head corresponds to the external one and is phonologically deleted for its identity with the external head. In this theory, the two heads are not part of a movement chain; "instead, an empty operator raises from the relative clause internal position to the initial position of the relative clause, and mediates the semantic relationship between the relative clause internal position and the head" (Sauerland, 2000: 1). Consider the example in (4):

(4) the [boy] [[Op/which_{boy}]Mary likes *t*]

According to the matching theory, the movement of the head in Italian subject and object relative clauses is represented as in (5) and (6), respectively.

(5) La mamma che < la mamma > bacia le bambine.

[_{DP} la [_{mamma}_i [_{CP} OP_i che [_{IP} *t*_i bacia le bambine]]]]

(6) L'elefante che i papà sollevano < l'elefante >.

[_{DP} L' [_{NP} elefante_i [_{CP} OP_i che [_{IP} i papà sollevano *t*_i]]]

More recent studies have postulated a *head raising* analysis of relative clauses (Vergnaud, 1974; Kayne, 1994; Bianchi, 1999), according to which the head moves from an internal position within the VP outside the relative clause. In the *head raising* account, the relative clause is selected by D°, the head of the DP, and the relative head raises to SPEC/CP. This kind of transformational relationship between the head and its copy involves A'-movement. Either the position from which the movement originates is marked by a *t* (trace), or it is considered as a copy of the moved constituent, which is phonetically unrealized (Chomsky, 1995). In any case, the moved constituent and the trace/silent copy form a chain. According to this theory, Italian subject and object relative clauses are represented as in (7) and (8), respectively.

(7) La mamma che < la mamma > bacia le bambine.

[_{DP} la [_{CP} [_{NP} mamma_i] che [_{IP} [_{NP} t_i] bacia le bambine]]]]

(8) L'elefante che i papà sollevano < l'elefante >.

[_{DP} L' [_{CP} [_{NP} elefante_i] che [_{IP} i papà sollevano [_{NP} t_i]]]]

I.III.II The pro-drop parameter

Italian is a *pro-drop* language, namely a language in which the subject can be phonologically null in all those situations when it can be inferred from the context. The setting of the *pro-drop* parameter on a positive value let the overt subject to be located either in a preverbal or a post-verbal position, as in (9):

(9) a. Maria ha telefonato.

Mary has phoned.

b. Ha telefonato Maria.

Has phoned Mary.

The fact that Italian is a *pro-drop* language also allows the embedded subject of a relative clause to be either in a preverbal or a post-verbal position, as in (10):

(10) a. Il cane che i papà lavano.

The dog that the fathers are washing.

b. Il cane che lavano i papà.

The dog that are washing the fathers.

The post-verbal position of the embedded subject in Italian usually accounts for a contrastive focus on the subject itself. In (10b), for instance, the dog is washed by *the fathers* and not by another agent. On the other hand, a preverbal embedded subject allows an interpretation with a contrastive focus on the event: for instance, in (10a), the dog is *washed, not soiled*, by the fathers. Therefore, the preverbal subject can also be omitted and be phonologically null, as in (11):

(11) Il cane che (i papà) lavano.

The dog that (the fathers) are washing.

A consequence of the possibility to locate the embedded subject in a post-verbal position is that an Italian relative clause containing semantically reversible verbs, as in (12), may give rise to an ambiguous interpretation between a subject and an object reading:

(12) Il bambino che pettina il nonno.

The child that is combing the grandfather.

In Italian, the subject of a relative clause like the one in (12) can be either the child or the grandfather, as shown in (13). If the subject is the child, the gap of the extracted constituent appears in a preverbal embedded subject position (13a), whereas if the subject is the grandfather, the gap appears in a post-verbal embedded object position (13b).

(13) a. Il bambino che <il bambino> pettina il nonno.

The child that <the child> is combing the grandfather.

b. Il bambino che pettina il nonno <il bambino>.

The child that is combing the grandfather <the child>.

In Italian, if the speaker wants to disambiguate between a subject and an object reading, he/she can adopt either a syntactic or a morphological strategy: in the first case, he/she will use a preverbal embedded subject, as in (14). In the second case, he/she will use a mismatch number condition, where the two DPs do not share the same number features, as in (15). Since in Italian the verb agrees in number with the subject, the unambiguous interpretation of (15) is allowed by the verbal morphology.

(14) Il bambino che il nonno pettina.

Il bambino che il nonno pettina <il bambino>.

The child that the grandfather is combing.

The child that the grandfather is combing <the child>.

(15) a. Il bambino che pettinano i nonni.

The child that are combing the grandfathers.

b. I bambini che pettina il nonno.

The children that is combing the grandfather.

I.IV The debate on the acquisition of restrictive relative clauses in typically and atypically developing children

I.IV.I The comprehension of subject and object relative clauses in typical and atypical development across different languages

The acquisition of relative clauses both in comprehension and production has been an important subject of debate in linguistic research over the last three decades. Early studies on relative clauses found a delay in the comprehension of such structures, with children performing at chance until the age of 5 (de Villiers, Tager Flusberg, Hakuta & Cohen, 1979; Sheldon, 1974; Slobin, 1971; Tavakolian, 1981). This finding was accounted for with several linguistic theories, attesting that children's grammar was different from that of adults due to their immature syntactic system (see the Interruption Hypothesis, Slobin, 1971; the Conjoined-clause analysis, Tavakolian, 1978, and the Initial NVN schema, de Villiers et al., 1979).

However, Hamburger & Crain (1982) demonstrated that when the experimental setting satisfies the felicity conditions, namely it is linguistically and pragmatically appropriate, American children can comprehend and produce relative clauses from the age of 4. Much more recently, Adani (2011) showed a ceiling performance in the comprehension of subject relatives already in 3-year-olds. At the same time, an asymmetry between subject and object relative clauses has been found in many studies (see Adams, 1990; Berman, 1997; Brown, 1972; Correa, 1995; de Villiers et al., 1994; McKee et al., 1998; Roth, 1984; Sheldon, 1974; Tavakolian, 1981), with ORs being acquired later than SRs, at the age of 4-5 (Adani, 2011; Friedmann and Novogrodsky, 2004) and being still problematic at adolescence (Volpato, 2010). Subject and object relative clauses differ from each other for the first merge position of the extracted constituent: while the moved element of SRs is the subject of the embedded clause, in ORs what moves is the object, as shown in (1):

(1) Subject relative: "The father that ___ is hugging the cats".

Object relative: "The cats that the father is hugging ___"

Studies on adult parsing of relative clauses also show an asymmetry between the two structures: even if both are accepted as grammatical sentences and correctly comprehended by adults, ORs require more time than SRs to be parsed (Cook, 1975; Ford, 1983; Frauenfelder et al., 1980; Hakes et al., 1976). Processing investigations on English (Crain and Fodor, 1985; Frazier and Clifton, 1989; Frazier and Flores d'Arcais, 1989; Frazier et al., 1983; Stowe, 1986) proposed the so called “active filler” effect, according to which “the parser tries to close an A’ relationship as soon as possible: when an A’ binder is processed, the parser tries to postulate the variable in the closest argument position, the subject position. [...] Such a resource-saving strategy (clearly expressed, e.g., by De Vincenzi’s 1991 Minimal Chain Principle) succeeds with subject relatives but fails with object relatives, which require reanalysis; whence the accrued complexity of object relatives” (Friedmann, Belletti, Rizzi, 2009: 2). The active filler effect has been re-elaborated by Friedmann, Belletti and Rizzi (2009) in terms of intervention: the A’ relation in ORs sometimes fails in children and is harder even for adults because of the presence of an intervener between the extracted constituent and its first merge, object position.

However, Friedmann, Belletti and Rizzi (2009) also claimed that not all ORs are difficult, but rather the deficit with object relative clauses might be selective, according to the structural similarity between the moved element and the intervening subject. To verify their hypothesis, they tested the comprehension of subject and object RCs in 22 children aged 3;7-5;0, all native speaker of Hebrew with typical development, either through a sentence-picture matching task or a sentence-scenario matching task. The children were divided in two age-matched group and group was administered one of the two tasks. In both of them, all RCs contained two referential noun phrases. Results of the first experiment show that children had no problems in comprehending SRs (90%), while they performed at chance with ORs (50%). Only 7/22 children performed above chance with ORs, whereas 22/22 performed above chance with SRs. As pointed out by the authors, the difficulty with ORs is overcome at the age of 6 (Friedmann & Novogrodsky, 2004). In a second experiment, they tested comprehension of object relatives with resumptive pronouns (optional in this kind of RCs in Hebrew) in the same participants. Again, they comprehended 56% of ORs (only 6/22 performed above chance), showing no facilitation effect with the inclusion of resumptive pronouns. In experiment 3 and 4, they manipulated the lexical restriction of the moved element and the intervening subject, testing the

comprehension of free relatives and relatives with impersonal *pro* subject, respectively. Interestingly, in both experiments the asymmetry between SRs and ORs disappears: in free relatives, children performed above chance in both constructions (84% SRs and 79% ORs). Also impersonal *pro* object relatives were comprehended above chance, with a very high percentage (83%) and with only 3/22 children performing at chance.

In 2010, Adani and colleagues tested the comprehension of RCs in three groups of Italian-speaking children, aged 5, 7 and 9. The hypothesis they wanted to verify was whether DP-internal features, such as Number and Gender, modulate the difficulty children experience with object relative clauses. They made the prediction that external and syntactically active features, such as Number, reduce intervention effect, whereas internal features, such as Gender, do it to a lesser extent. They based their hypothesis on adult processing studies, showing that adults are facilitated in the comprehension of ORs when the two constituents are different NP types: namely, the head is lexically specified while the embedded constituent is a pronoun (Garraffa and Grillo, 2008; Grillo, 2009; Gibson, 1998) or a proper name (Gordon et al., 2004; 2001). The targeted sentences displayed both number match conditions (*Il leone che il gatto sta toccando è seduto per terra* ‘the lion-SG that the cat-SG is touching is sitting-SG, *I coccodrilli che i cammelli stanno toccando sono seduti per terra* ‘the crocodiles-PL that the camels-PL are touching are sitting-PL) and number mismatch conditions (*Il leone che i coccodrilli stanno toccando è seduto per terra* ‘the lion-SG that the crocodiles-PL are touching is sitting-SG’, *I coccodrilli che il leone sta toccando sono seduti per terra*, ‘the crocodiles-PL that the lion-SG is touching are sitting-PL’). Results of the experiment showed that Number features dissimilarities were more accurate than Gender ones for all the age groups. Moreover, mismatch conditions were always more accurate than match ones. Comparing the performance of the different age groups, 5 year-olds were less accurate than 7 and 9. The authors’ conclusion was that the Number features associated to the DPs modulate the comprehension of object relative clauses.

A year later, Adani (2011) presented data on 3 to 7 - years-old Italian children on the comprehension of SRs, ORs with preverbal subjects and ORs with post-verbal subjects. Results confirm the subject/object asymmetry in the comprehension of relative clauses, with very high accuracy scores in SRs, where all children performed at ceiling. Conversely, in object relative clauses, accuracy scores increase with age

and according to the position of the subject (from 53% to 89% with preverbal subject, from 36% to 70% with post-verbal subject). The author also confirmed the early mastery of subject relatives, comprehended from the age of 3;4; on the contrary, object relatives with preverbal subject were above chance from the age of 4 and object relatives with post-verbal subject were comprehended above chance only at 7.

A similar investigation was conducted by Volpato (2012) on normal-hearing and hearing-impaired children receiving a cochlear implant. As pointed out by the author, the comprehension of complex syntactic structures has proven to be particularly problematic for hearing-impaired children (see De Villiers 1988, for English; Friedmann & Sztermann 2006, Friedmann et al. 2008 for Hebrew; Delage et al. 2008, for French; Volpato & Adani 2009, Volpato 2010, for Italian). Even though the same subject/object asymmetry was found for hearing-impaired individuals, they performed significantly less accurately than normal-hearing children on the comprehension of relative clauses. The first study investigating the comprehension of restrictive relative clauses in cochlear-implanted children was Volpato & Adani (2009): they administered a comprehension task to eight cochlear-implanted children (mean age 7;9), compared to three control groups of TD children, matched on morpho-syntactic abilities (age range 3;6-5;11), receptive vocabulary (5;4-7;0) and chronological age (7;1-7;8). The task verified the comprehension of subject relatives as in (1), object relatives with a preverbal subject as in (2) and object relatives with a post-verbal subject as in (3) (examples 2 and 3 taken from Volpato, 2012).

(2) il cavallo [che i leoni stanno inseguendo <il cavallo>]

the horse [that the lions are chasing <the horse>]

(3) il cavallo [che inseguono i leoni <il cavallo>]

the horse [that are chasing the lions <the horse>]

All the items presented a mismatch condition: the relative head was always singular while the embedded noun was always plural. Interestingly, the authors found the same gradient of difficulty in all groups: subject relatives were easier to comprehend than object relatives, and object relatives with preverbal subjects were easier than object relatives with post-verbal subjects. Differently from Volpato &

Adani (2009), in which the number features were always singular on the head and plural on the embedded noun, in Volpato (2012), the two nouns presented either the same number features (match condition) or different number features (mismatch condition), with the expectation that children’s performance would be better in mismatch conditions. The task was administered to a group of 13 Italian hearing-impaired children with a cochlear implant (CI) (mean age 9;2) and 13 normal-hearing Italian-speaking children (NH) matched for linguistic age (6;7). Results showed that the hearing-impaired group performed worse than the normal-hearing one. Moreover, as in Volpato & Adani (2009), the comprehension of SRs was significantly better than that of ORs, and ORs with a preverbal subject were significantly more accurate than ORs with a post-verbal subject. In object relatives with preverbal subject, the hearing-impaired group performed significantly better in match conditions; conversely, the normal-hearings scored higher percentages of accuracy in mismatch conditions, although no statistical significance was found. It seems “that number features are crucial for the comprehension of object relatives by NH children, while CI children are less sensitive to number features, and their performance is influenced by the co-occurrence of different phenomena” (Volpato, 2012: 10). This confirmed previous findings attesting that the presence of disjoint number features on the DPs reduces intervention and favours sentence comprehension (Adani et al., 2010). More specifically, NH children found easier to comprehend a sentence like (4), where the embedded noun is plural and the relative head is singular, compared to (5), where conversely the head is plural and the embedded noun is singular. According to Volpato (2012), “plural agreement on the embedded subject and the verb appears to be the relevant cue helping NH children’s performance in sentences like (11) [4]. Children find a double plural markedness, which implies more visibility of the number features, and plurality appears to drive correct sentence interpretation”. Importantly, in (4), the plural feature is represented in the Number projection, whereas in (5), the Number feature is not represented in the clause, since the embedded noun and the inflected verb are singular.

(4) La gallina che i pulcini beccano <la gallina>

The hen that the chicks peck <the hen>

[CP... [DP... [NumP... [NP...]]] [VP]]

(5) Le galline che il pulcino becca <le galline>

The hens that the chick pecks <the hens>

[CP... [DP... [NP...]] [VP]]

According to Volpato (2012), a possible explanation for the performance of CI children, who comprehend better ORs with a match condition and fail to comprehend sentences like (4), is that number features are inaccessible or underspecified on verbal plural forms in language impaired populations (as reported by Chinellato, 2004, for agrammatic patients and Chesi, 2006, for hearing-impaired individuals). Consequently, singular features are preferred over plural ones by CI children.

The fact that object relatives with post-verbal subject are less accurate in both groups, and particularly in CI children (with a significant difference between the two groups) is accounted for in terms of overloading of the memory system: since the OVS order is unexpected in Italian, and CI children are also strictly instructed to the SVO order (Chesi, 2006), keeping “verbal morphology in stand-by until the post-verbal subject is encountered is extremely taxing for all children and contributes to overload the memory system” (Volpato, 2012: 16).

I.IV.II The production of subject and object relative clauses in typical development across different languages

As regards the production of restrictive RCs, investigations on children’s spontaneous speech (Diessel & Tomasello, 2000) and elicited production experiments (Crain, McKee & Emiliani, 1990; Diessel & Tomasello, 2005; Guasti & Cardinaletti, 2003; Belletti & Contemori, 2010; Contemori, 2011) demonstrated that children produce subject and object relative clauses from the age of 3-4. According to Diessel & Tomasello (2000), the earliest attempts occurred at the age of 2 and could be interpreted as prepositional sentences. Moreover, the subject/object asymmetry found in comprehension was confirmed also in production: while children scored very high percentages of SRs, almost at ceiling, they found much more difficult to produce object relatives.

After the pioneering experiment of Hamburger & Crain (1982), children’s production of relative clauses has been investigated in a number of studies across languages (Labelle, 1990 for French; Håkansson and Hansson 2000 for Swedish,

McKee et al. 1998 for English; Ferreiro et al., 1976 for Spanish, Novogrodsky and Friedmann, 2006 for Hebrew). Labelle (1990) analyzed the production of different kinds of relative clauses (subject, direct object, indirect object, locative and genitive) in 3 to 6-year-old French-speaking children. She documented a massive use of resumption, as in (6), which was totally used 33% of times. NP resumption was attested at 16% and gap relatives at 51%. Importantly, resumption was used in all types of relative clauses investigated, particularly in locative and genitive constructions, reported in (7) and (8) respectively. Children also used resumption in subject relatives 25% of times, despite the fact that it is ungrammatical in adult speech and that subject relatives are very frequent in the input (they are attested as early as 2).

(6) “Sur la balle qu’i(l) l’attrape” (3;08).

On the balle that he it catches.

(7) “Sur la boîte que le camion rentre dedans (4;08).

On the box that the truck goes inside-it.

(8) “Sur le petit garçon que son chien i(l) dort (5;00).

On the little boy that his dog he sleeps.

In 1998, McKee, McDaniel and Snedeker elicited the production of relative clauses in 28 English-speaking children aged 2;2-3;10 (mean age 3;3) adopting Hamburger and Crain’s (1982) methodological suggestions to create felicity conditions. They found that most children participating at their experiment produced adultlike relative clauses most of the time: out of 336 items, 252 (75%) were appropriate relative clauses, of which 184 (73%) met the criterion for full forms (they contain both a relative pronoun and an auxiliary verb), 38 were reduced relatives (15%) and 30 (12%) were zero-complementizer RCs (object relatives). Only 7 sentences, produced by 4 children, contained a resumptive pronoun, interpreted by the authors as cases of performance demands (also this type of response is adultlike, since English speakers sometimes use resumption when they get trapped in very complex relatives). Examples of each type of target relative clauses, taken from

McKee et al. (1998) are given in (9-11). In (12) examples of RCs with resumptive pronouns are reported.

- (9) FULL RCs: a. “That one that’s jumping on the table”. (2;10)
 - b. “Pick up this one, that Minnie Mouse is hiding in”. (2;11)
 - c. “The one that’s being jumped on”. (3;7)
- (10) REDUCED RCs: a. “Those hopping on the tomato”. (2;2)
 - b. “That bicycle running back and forth”. (2;11)
- (11) ZERO-COMPLEMENTIZER RCs: a. “The ones they’re eating”. (2;11)
 - b. “The toy he’s hitting on”. (3;10)
- (12) a. “Pick those two up what the dinosaur is eating them”. (2;10)
 - b. “That one which is Bert patting it”. (3;2)

An experiment investigating the production of relative clauses in Hebrew (both in typically and atypically developing children) is the one carried out by Novogrodsky and Friedmann (2006), who compared the performance of 18 Hebrew-speaking SLI participants, aged 9;3-14;6, with a group of 28 younger typically developing children (7;6-11;0) using a preference and a picture description task. As regards TD children, results show that they had no difficulties with SRs and ORs: indeed, they were 98% correct on subject relatives and 94% correct on object relatives. Interestingly, the authors found no difference between the age groups, and none of the participants avoided the production of relative clauses. These findings support their theory that at least at the age of 7;5 Hebrew-speaking children master the production of right-branching relative clauses.

Several studies have investigated the production of relative clauses in Italian TD children (Guasti & Cardinaletti, 2003; Utzeri, 2006, 2007; Belletti and Contemori, 2010; Contemori, 2011; Guasti et al., 2012). Guasti & Cardinaletti (2003) investigated the production of subject relatives, direct object relatives, indirect object relatives, locative relatives, genitive relatives in a group of Italian-speaking children aged 5;1–10 and a group of French-speaking children aged 4;5-7;3. They found that SRs were correctly produced by children, even when other types of relative clauses were elicited. Interestingly, both subject and direct object relative clauses produced by children were introduced by the right complementizer and rarely contained resumptive pronouns, a performance consistent with adults’ behaviour. A strategy

adopted when ORs were elicited was the transformation of the target OR into a SR by passivizing the verb, as in (13):

(13) “Tocca il cammello che è stato comprato dal bambino”. (9;03)

Touch the camel that has been bought by the child.

TARGET: “Tocca il cammello che il bambino ha comprato”

Touch the camel that the child has bought.

Utzeri (2006) was the first work on Italian adopting Novogrodsky and Friedmann’s (2006) Preference Production Task to elicit relative clauses. The experimental study on Hebrew-speaking SLI and TD children was adapted in order to elicit SRs and ORs in 41 Italian-speaking TD children attending the primary school (6-11), compared to a group of 30 adults (age 15-73). The author found that both groups avoided object relativization, even if children produced a higher percentage of ORs than adults. The targeted sentences included 12 relative clauses, 6 SRs and 6 ORs, all of them presented in a match condition: this means that the child was told 6 stories eliciting ORs with two singular NPs, as in the example in (14), taken by Utzeri (2006):

(14) EXPERIMENTER: “Ci sono due bambine. La mamma sta baciando una bambina, il nonno sta baciando un’ altra bambina. Quale bambina preferiresti essere? Inizia con

“(Preferirei essere) la bambina che...”

“There are two children. The mother is kissing one child, the grandfather is kissing another child. Which child would you rather be? Start with “(I would rather be) the child that...”

TARGET: “La bambina che la mamma sta baciando”.

“The child that the mother is kissing”.

The presence of a match condition made it possible that children produced some ambiguous object relative clauses, as in (15), taken from Utzeri (2006). Sometimes, a

sentence like (15) was followed by another RC disambiguated by the (preverbal) position of the embedded NP, with a DP resumption, as in (16):

(15) “La bambina che bacia il nonno”.

(16) “La bambina che il nonno bacia la bambina”.

The most important conclusions drawn by Utzeri (2006; 2007) were the following ones: both children and adults avoided to relativize the object by turning the ORs into SRs; however, whereas children showed several ways of avoiding relativization of the object, namely PORs (17), passive causative constructions (18), “receive + DP” (19), and change of the verb (20), adults systematically used passive object relative clauses. Consider the following examples taken from Utzeri (2006):

(17) “Il bambino che è coperto dalla mamma”.

The child that is wrapped up by the mother

TARGET: “Il bambino che la mamma copre”.

The child that the mother is wrapping up

(18) “Il bambino che si fa pettinare dal re”.

The child that himself makes comb by the king

“The child that makes himself comb by the king”.

TARGET: “Il bambino che il re pettina”.

The child that the king is combing.

(19) “Il bambino che riceve un bacio dalla mamma”.

The child that receives a kiss by the mother.

TARGET: “Il bambino che la mamma bacia”.

The child that the mother is kissing.

(20) “Il bambino che legge al nonno”.

The child that is reading to the granddad.

TARGET: “Il bambino che il nonno ascolta”.

The child that the granddad is listening to.

In 2010, Volpato compared the performance of Italian-speaking children with adolescents and adults, using again the Preference Production Task. As regards the production of SRs, percentages are very high in all groups (adolescents produced 100%, adults 98% and children 92%). On the contrary, adolescents and adults never produced ORs, preferring to turn them into SRs; children produced instead 37% of ORs, including those with resumption. The most preferred strategy in the groups of adolescents (82%) and adults (97%) was the passivization of the verb.

Other studies which contributed to the debate on the acquisition of Italian relative clauses are the ones made by Belletti and Contemori (2010) and Contemori (2011). Belletti and Contemori (2010) compared the production of ORs and SRs in Italian children aged 3;4 to 6;5 to a control group of Italian adults. In line with Utzeri (2006) and Guasti & Cardinaletti (2003), they found even in younger children a marked asymmetry between SRs and ORs, with children avoiding ORs in various ways, first of all by turning the OR into a SR. As children grew older, they preferred to turn the ORs into SRs using “passive object relatives” (Belletti, 2009). Another frequent strategy adopted by children was the use of a nonstandard resumption of the object through a clitic pronoun or the repetition of the relative head, a strategy which is largely adopted cross-linguistically (child Italian: Guasti & Cardinaletti, 2003; child English: de Villiers, 1988; McDaniel et al., 1998; child French: Guasti & Cardinaletti, 2003; Guasti et al., 1996; Labelle, 1990; child Spanish: Ferreiro et al., 1976). The control group of adults, as in the pilot experiment of Utzeri (2006), transformed the vast majority of ORs into SRs with the use of passive sentences. However, a striking result of this experiment is the very high percentage of ORs produced by children, even younger ones (38% in 6-year-olds, 52% in 4-year-olds, 46% in 5-year-olds, 45% in 6-year-olds). These high percentages, which contrast with previous studies on Italian using the Preference Task (Utzeri, 2006, 2007; Volpato, 2010) could be explained analyzing the typologies of answers interpreted by the authors as standard ORs: namely, the production of ORs without the relative head, as in (21), taken from Belletti and Contemori (2010):

(21) “Che bagna l’elefante”. (5;7)

That (he) is wetting the elephant.

TARGET: “(Vorrei essere) il bambino che l’elefante solleva/bagna”.

(I would rather be) the child that the elephant is lifting up/wetting.

We think that a sentence as the one in (21) must not be interpreted as a standard OR, since they are ambiguous between an interpretation as a relative clause missing the relative head, or just a declarative sentence (“(Mi piace) che bagna l’elefante”, “(I like) that (he) is wetting the elephant”). Therefore, we will not compare these percentages with the ones collected in our study, but notwithstanding we will consider Belletti and Contemori’s (2010) experiment to underline the asymmetry found by the authors between SRs and ORs in both groups even in younger children, with passive object relatives as the preferred option used by older children and adults to avoid the more demanding construction of ORs.

In Contemori (2011), the same typology of answer as in (21) was again interpreted as an OR. Consider examples (22), (23), and (24), taken from Contemori (2011) and coded as OR with gap, OR with clitic pronoun and with DP resumption, respectively:

(22) “Che il babbo pettina”. (5;10)

That dad is combing.

TARGET: “(Vorrei essere) la bambina che il vicino/il papà pettina”.

(I would rather be) the girl that the neighbor/dad is combing.

(23) “Che l’elefante la sta alzando”. (5;11)

That the elephant is lifting her up.

TARGET: “(Vorrei essere) il bambino che l’elefante solleva/bagna”.

(I would rather be) the boy that the elephant is lifting up/wetting.

(24) “Che l’elefante bagna il bambino”. (5;10)

That the elephant is wetting the child.

TARGET: “(Vorrei essere) il bambino che l’elefante solleva/bagna”.

(I would rather be) the boy that the elephant is lifting up/wetting.

Contemori (2011) elicited the production of restrictive relative clauses in 99 Italian-speaking TD children aged 3;4-8;10, with a Preference and a Picture description task. Results show a subject/object asymmetry for all age groups. Moreover, the author outlined the emergence of passive at the age of five as a strategy to avoid relativization on the object, consistently used by each age group.

This results is in line with Utzeri (2006), where older children largely used passive object relatives.

The subject-object asymmetry in the acquisition of Italian RCs has been corroborated also by Guasti, Branchini, Arosio, Vernice (2012). The authors compared the production of two groups of TD children, aged 5 and 9 years, using an elicitation task adapted from Hamburger and Crain (1982) and Crain and Thornton (1998). An example of the stories told to the child to elicit a RC is given in (25):

(25) There are two pigs, two sheep and two lions. One pig plays with the lions, the other one wants to play a trick and hides the two sheep. What would you say to the puppet if you wanted it to touch this pig?

TARGET: Touch the pig that hides the sheep.

With this experiment, the authors wanted to verify the importance of animacy in a task eliciting RCs, as it has been shown for comprehension of ORs (Arosio et al., 2011). For this reason, they tried to elicit 6 SRs and 6 ORs with two animate NPs and 6 SRs and 6 ORs with an animate subject and an inanimate object. The results of the experiments confirm the subject-object asymmetry in the acquisition of RCs, which persists in older children, and the role played by the animacy feature only in the younger group. “The percentage of correct and target object RCs in 5-year-old children is higher when the subject and the object do not share the +animate feature (and the object is inanimate). Younger children, whose grammatical system is not yet mature, take advantage of the mismatch in animacy feature of the two arguments of the RC in the production of the syntactic structure posing more difficulties, namely object RCs” (Guasti et al., 2012: 112 - 113).

I.IV.III The production of subject and object relative clauses in atypical development across different languages

The production of restrictive relative clauses has been widely investigated also in language impaired populations (for SLI see Håkansson & Hansson, 2000 for Swedish; Stavrakaki, 2001; 2002 for Greek; Friedmann & Novogrodsky, 2004; Novogrodsky & Friedmann, 2006 for Hebrew; Marinis & van der Lely, 2007; van

der Lely & Battell 2003 for English; Hamann et al., 2007, for French, Contemori and Garraffa, 2010, 2013 for Italian; for hearing-impaired children see Friedmann et al., 2008 for Hebrew; Volpato, 2010 for Italian).

In 2002, Stavrakaki investigated the production of subject and object relative clauses in a group of Greek-speaking SLI children, aged 5;4-9;4 (mean age 7;38) compared to 16 TD children aged 3;4-5;2 (mean age 4;1). She found that the performance of SLI children was significantly worse (4%) than TD children (71%), particularly on object relatives. Indeed, 4 out of 5 relatives produced by SLI were subject relatives (SS) as in (26). On the contrary, TD scored high level of performance both in subject (SS) and object relatives (OO) (83% and 85% respectively). Their performance dropped in SO (58%), OS (60%, see 29) and OS with clitic (60%). See examples below (26-30) of each type of relative.

(26) SS “I tigrī pou htipai ton elefanta sprohni ti zevra”.

The tiger that is hitting the elephant is pushing the zebra”.

(27) OO “O elefantas kinigha tin kamilopardali pou htipa o rinokeros”.

The elephant is chasing the giraffe that the rhino is hitting.

(28) SO “O skilos pou filai I tigrī htipa rinokero”.

The dog that the tiger is kissing is hitting the rhino.

(29) OS “I alepou sprohni ti ghata pou kinighai to skilo”.

The fox is pushing the cat that is chasing the dog.

(30) OS WITH CLITIC “To alongo htipa to provato pou to kinighai to elati”.

The-horse-hit-the-sheep-that-clitic-chase-3s-the-deer.

The horse is hitting the sheep that the deer CLIT is chasing.

SLI children also differs from TD for their preference for the SVO order: they totally produced 63% of simple active sentences with SVO order (vs. 30% in TD) and 13% of relatives missing the relative head. Importantly, they also uttered relative clauses with DP resumption, as in (31):

(31) O rinokeos pu i tigrī filai to rinikero.

The rhino that the tiger is kissing the rhino.

TARGET: The rhino that the tiger is kissing.

The production of relative clauses in typical and atypical development was also investigated by Novogrodsky and Friedmann (2006), who compared the performance of 18 Hebrew-speaking SLI children, aged 9;3-14;6, with a group of 28 younger typically developing children (7;6-11;0) using a preference and a picture description task. Results show that TD children had no difficulties with SRs and ORs: indeed, they were 98% correct on subject relatives and 94% correct on object relatives. On the contrary, SLI children found the two tasks problematic: in the Preference Task, they produced significantly fewer object relatives (60% compared to 94% in TD children) and subject relatives (94% compared to 99%). In the Picture Description Task as well, fewer object (46% vs 94%) and subject relatives (83% vs 98%) were produced by the SLI-participants. The few incorrect responses of SLI children (6%) when a SR was elicited included: simple sentences (32), a resumptive pronoun in the embedded subject position (33) and the doubling of the relative head with a full DP (34).

(32) ha-xayelet ha-zot malbisha et ha-axot
 the-(female)-soldier the-this dresses ACC the-nurse
 “This soldier dresses the nurse.”

(33) *ze ha-leican she-hu soxev ta-dubi
 this the-clown that-he carries ACC-the teddy-bear
 “*This is the clown that he carries the teddy bear.”

(34) *ze ha-yeled she-ha-yeled roxec et ha-aba
 this the-boy that-the-boy washes ACC the father
 “*This is the boy that the boy washes the father.”

Moreover, SLI children’s percentage of gap ORs was much lower than in TD children: 33% compared to 64% in the Preference Task, 13% compared to 60% in the Picture Description Task. The non target responses in SLI in both tasks included: thematic errors (35), reduction of thematic roles (36), and doubling of the relative head (37). Finally, the SLI children, but not the TD participants, avoided to produce ORs by using simple sentences, sentence fragments (38), or adjectival passives (39).

Actually, passives are very rare in Hebrew, and are often attested in written language.

(35) Object relative with an arbitrary subject:

Ha-yeled she-mecalmim oto

the-child that-photograph-pl him

“The child that (someone) photographs.”

TARGET: “The child that the guide photographs.”

(36) Subject relative with a reflexive verb:

ha-yeled she-mitraxec

the-child that-washes-refl

“The child that washes himself.”

TARGET: “The child that the father washes.”

(37) Doubling of the relative head:

*ha-yeled she-ha-saba menashek yeled exad

the-child that-the-grandfather kisses child one

“*The child that grandfather kisses one child.”

TARGET: “The child that grandfather kisses.”

(38) Fragments of sentences:

*ha-yeled she-saba

the-child that-grandfather

“*The child that grandfather.”

TARGET: “The boy that grandfather feeds.”

(39) Adjectival passive:

ha-yeled ha-mecuyar

the-child the-painted

“The painted child.”

TARGET: “The boy that the teacher paints.”

Another important study on Italian typical and atypical development was the one conducted by Volpato (2010), who elicited the production of subject and object relative clauses in normal hearing and hearing impaired children with a cochlear implant, using a Preference Task adapted from Novogrodsky and Friedmann (2006). As regards the production of SRs, the level of accuracy was lower in hearing impaired (88%) than in normal hearing children (99%). She also found a significant difference between the two groups for object relatives (6% in hearing impaired, 14% in normal hearing children). In both groups of children, the difference between the percentage of targeted SRs produced and that of ORs was very evident. Moreover, if we also include resumptive ORs in the number of ORs produced, an interesting pattern emerges: children with cochlear implant preferred to produce clitic resumptive (43% of the total amount of ORs produced) and DP resumptive ORs (32%) whereas the percentage of gap ORs was lower (24%). As regards normal hearing children, they produced a higher percentage of gap ORs (39%) compared to hearing impaired, 47% of clitic resumptive ORs, and a much lower percentage of DP resumptive ORs (14%). Therefore, clitic resumption seems to be a preferred strategy in both groups (43%-47%) whereas DP resumption is much more used by hearing impaired children. Another strategy frequently used by hearing impaired children when an OR was targeted, was the passivization of the verb and the production of a SR (25% against 14% in normal hearing children). On the other hand, two frequent strategies adopted by normal hearing children were the use of the causative construction *farsi + verb* (21% of times) and the transformation of the OR into a SR by turning the embedded subject into the relative head (24%), as in the example below:

(40) “Il papà che pettina i bambini”.

The father that is combing the children.

TARGET: “I bambini che il papà pettina”.

The children that the father is combing.

Interestingly, some typologies of sentences were produced only by hearing impaired children, namely incomplete sentences (41) or ungrammatical sentences (42), in line with Novogrodsky and Friedmann (2006) and Friedmann and Sztermann (2006):

(41) “Premia i bambini”.

(She) is awarding the children.

TARGET: “I bambini che la maestra premia”.

The children that the teacher is awarding.

(42) “Mi piace il bambino così cammina e così il cane insegue”.

I like the child so he is walking and so the dog is chasing (SUBJ)

TARGET: “Il bambino che il cane insegue”.

The child that the dog is chasing.

An experiment investigating the elicited production of relative clauses in Italian both in TD and SLI children is the one carried out by Contemori and Garraffa (2010). The authors elicited RCs in four pre-school aged Italian children with SLI (4;5-5;9) using a picture description and a preference task, both adapted from Novogrodsky and Friedmann (2006). In the same study, they also tested comprehension of RCs and asked children to repeat 30 sentences with SRs and 30 with ORs.

As regards the production task, the performance of SLI children was poorer than that of the control with both SRs and ORs. SLI children produced significantly fewer target SRs (13% against a mean of 85% in the two control groups) and significantly fewer target ORs (3% against a mean of 22% in the control). When SRs were targeted, SLI children produced a very high number of declarative clauses (26%) or in many cases they gave no response (53%). When ORs were elicited, SLI children preferred to use declarative clauses (38%) or gave no response as well (53%), whereas TD children used a wider variety of answers, like ORs with a resumptive DP (8%), or with a resumptive clitic (16%), ambiguous ORs with post-verbal subject (26%) (see example 43), declarative clauses (16%), SRs (5%). Interestingly, they gave no response only in 4 over 240 items (3%).

In some cases when a SR was targeted, the complementizer was substituted by an incompletely pronounced element (44), an error which was made 5% of times by SLI group but not by the control participants.

(43) “Il dottore che dipinge il soldato” (TD: 5;5)

The doctor that paints the soldier.

TARGET OR: “Il dottore che il soldato dipinge”.

(44) “Il bambino [e] lava il pinguino”. (SLI: 5;9)

The child [e] is washing the penguin.

TARGET SR: “Il bambino che lava il pinguino”.

SLI children also found the repetition task problematic: they repeated significantly fewer target SRs (0,8%) and ORs (1,6%) than the control (87% and 84% respectively). The most common errors were the omission of the complementizer (SRs: 18,3%; ORs: 36,6%) and the use of declarative clauses (SRs: 64%; ORs: 37,5%). Crucially, declarative clauses are absent in older TD children and marginally present in younger ones, and complementizer omission is not attested in TD.

The conclusion drawn by the authors is that SLI children are unable to produce and repeat correct SRs and ORs, even if they are able to comprehend them. Moreover, different kinds of responses are produced by SLI and control children in order to avoid SRs and ORs: SLI very often gave no response, while TD children rarely resorted to this option. The authors found particularly interesting the fact that SLI children found even the production of a simpler structure like SRs problematic, which are normally attested at around age 2-3 in TD children (Guasti, 2002).

A problem we have encountered in this study, as in other experiments of the same authors (Belletti and Contemori, 2010; Contemori, 2011) is the decision to code the sentence types in (45-46) as correct SRs and ORs respectively. We think that such a procedure is incorrect, since the relative clauses lack the relative head and thus could be also interpreted as declarative sentences.

(45) “(La bambina) che lava la giraffa”.

(The girl) that is washing the giraffe.

(46) “(La bambina) che la giraffa lava”.

(The girl) that the giraffe is washing.

Another study by Contemori and Garraffa (2013), investigated the elicited production of SRs and ORs in a group of nineteen preschool aged children with SLI

(4;3-6;3) and a control group. Interestingly, the authors found a significantly divergent pattern between the two groups in the production of SRs (37% in SLI children compared to 81%), whereas no such difference emerges in ORs (12% compared to 21%), probably because ORs posed greater difficulties to both groups. Contemori and Garraffa (2013) suggested to consider SRs as a linguistic marker for SLI in preschool-aged children. With the words of the authors, “while the production of SRs clearly distinguishes between SLI and age-matched TD, the production of ORs does not show any difference between the two groups, as ORs are also hard to produce for TD children, and avoided by different types of strategies.” (Contemori and Garraffa, 2013: 73). Finally, they also confirmed the SRs-ORs asymmetry in both groups, which suggests a similar pattern of development in TD and non TD children as regards RCs, even if delayed in SLI.

I.IV.IV The use of resumptive pronouns in typical development

“A resumptive pronoun is a pronominal variable that appears in a position in which a gap would appear” (McCloskey, 1990: 95). The use of these pronominal elements in the acquisition of RCs has been attested in several languages, some of them accepting resumption as a standard, alternative strategy to form relative clauses (“true resumptive languages”, like Hebrew, Palestinian, Irish, Modern Greek), other attesting this linguistic phenomenon only in child language (“intrusive resumptive languages”, like French, English, Italian) and in spoken colloquial language by people of different socio-economic background (see Cinque, 1988 and Guasti & Cardinaletti, 2003 for Italian). As pointed out by Armon-Lotem et al. (2005), the use of resumptive pronouns and resumptive DPs in early relative clauses is particularly conspicuous in “intrusive pronouns” languages (Sells, 1984), like English or French, where resumption is allowed in adult grammar only in those positions where wh-movement does not occur (Islands).

Labelle (1990) showed that French-speaking children aged 3 to 6 largely used resumptive pronouns in RCs production, both in SRs (see examples 47-49) and ORs (51-52). The stimuli used to test SRs was a little girl for each targeted sentence. Children tended to use the complementizer *que* plus the feminine subject pronoun *elle* (qu’a = que elle), instead of the complementizer *qui*, which is normally used in French to form SRs. With the words of the author, “the resumptive strategy is

unambiguously used over 25% of the time despite the fact that it is ungrammatical in adult speech, that subject relatives are extremely frequent in spoken French, and that they appear in child language as early as age 2;0” (Labelle, 1990: 102). Importantly, children never used the complementizer *que* followed by a gap in subject position, as in (50), taken from (Labelle, 1990). According to the author, “the fact that children do not produce such sentences shows that their grammar obeys the empty category principle, that is, children know that it is impossible to have an ungoverned empty category” (Labelle, 1990: 103).

(47) “C’est la celle **qu’a** dessine”. (3;04)

It’s the one that she is drawing.

(48) “La petite fille **qu’a** est assis sur la boîte”. (4;09)

The little girl that she is sitting on the box.

(49) “Sur la petite fille **que a** met son pyjama”. (4;02)

On the little girl that she is putting her pyjamas on.

(50) * La fille que court.

The little girl that runs.

(51) “Sur la balle **qu’il l’attrape**”. (3;08)

On the ball that he is catching it.

(52) “Sur la balle **qu’il lance la balle**”. (5;00)

On the ball that he is throwing the ball.

The use of resumptive pronouns in early acquisition was also confirmed in many other languages, as Spanish (Pérez-Leroux, 1995), English (Mckee and McDaniel, 2001; Pérez-Leroux, 1995) and Hebrew (Armon-Lotem, Botwinik and Birka, 2005). Consider the following examples, quoted in Cinque (2011):

(53) (Pérez-Leroux 1995, 114): “El gato empuja al **perro** que el conejo lava al **perro**”. (5;6)

(54) (Pérez-Leroux 1995,121f): “The **one** that the mailman is holding **the baby**”.
(4;11)

(55) (Armon-Lotem, Botwinik and Birka, 2005, 1): “**ha-ec** she-ha-gamad tips al **ha-ec**”.
the-tree that-the-dwarf climbed on the-tree; ‘the tree on which the dwarf climbed..’

Mckee and McDaniel (2001) reported elicited production data on English from 2 experiments, the first testing 82 children aged 3;5-8;11 and 34 adults, the second testing 89 children, also aged 3;5-8;11 and 20 adults. In Experiment 1, participants took part in a game eliciting different kinds of subject relative clauses: with short subject (56), long subject (57), embedded subject (58), unextractable subject (59) or a subject located after an embedded sentence beginning with “whenever” (60).

(56) Pick up the elephant that (it) is flying on a plane.

(57) Pick up the rabbit that maybe maybe maybe (it) sees Tigger.

(58) Pick up the pizza that Ariel dreamed (it) was yummy.

(59) Pick up the lion that Grover doesn’t know what (it) ate.

(60) Pick up the boy that, whenever it rains, (he) cries.

The authors found that the presence of resumptive pronouns is related to the principle of extractability; linear distance also plays a role, even if a much weaker one. Indeed, the sentences which elicited frequent use of resumptives were the unextractable subject items and the *whenever* items. Importantly, resumptive DPs occurred more in those cases where English grammar disallows them, whereas children’s resumptive pronouns were adultlike.

In Experiment 2, they tested the same factors that influence the distribution of resumptive elements in different kinds of relative clauses: direct object (61), object-of-preposition (62), genitive subject (63), genitive object (64).

(61) Pick up the cat that Goofy is petting (it).

(62) Pick up the girl that the giraffe is sitting on (her).

(63) Pick up the baby that (her) teddy bear is riding in the wagon.

(64) Pick up the robber that Dorothy is swinging (his) rope.

The only sentence type that elicited frequent use of resumptive elements was the genitive object. This one differs in terms of extractability. Also in this experiment, DP resumptive elements appear in those cases where they are disallowed by the grammar.

In Italian, the use of resumptive pronouns and DPs has been confirmed by many studies eliciting relative clauses (Guasti & Cardinaletti, 2003; Utzeri, 2006, 2007; Volpato, 2010, among others). Here we report two examples, taken from Utzeri (2007) (65) and by Volpato (2010) (66).

(65) “**La bambina** che la mamma **la** copre”.

“The child that the mother is wrapping her up”.

(66) “**Il bambino** che l’orso accarezza **il bambino**”.

“The child that the bear is caressing the child”.

Guasti & Cardinaletti (2003), who investigated the production of subject relatives, direct object relatives, indirect object relatives, locative relatives, genitive relatives in a group of Italian-speaking children aged 5;1–10;0 and a group of French-speaking children aged 4;5-7;3, found that both subject and direct object relative clauses produced by children were introduced by the right complementizer and rarely contained resumptive pronouns, a performance consistent with adults’ behaviour. Resumptive pronouns were not used equally often in all kinds of relative clauses: children tended to use them in relatives on the indirect object, genitive and locative relatives, particularly when these were introduced by the complementizer *che*. On the contrary, subject and direct object relative clauses almost never contained a resumptive pronoun.

Indeed, in Italian, as in other Romance languages, like Spanish and northern Italian dialects, resumptive pronouns are also used in adult grammar for different types of RCs, first of all oblique relatives (Mulas, 2001, examples quoted in Volpato, 2010). In this case, resumption is used by adults to rely on simpler constructions than RCs with complementizer like “a cui” (to whom) or “in cui” (in which), more frequent in formal, written language.

(67) Indirect object relative: “Sono un tipo che gli piace rischiare”.

I am a fellow that to him pleases to risk.

(68) Locative relative: “È una libreria che ci vado ogni tanto”.

(It) is a bookstore that I there go from time to time.

I.IV.V The use of resumptive pronouns in atypical development

As regards the production of resumptive restrictive relative clauses in atypical development, this was widely investigated in several studies by Friedmann and colleagues on Hebrew-speaking children. In 2006, Friedmann and Sztermann elicited relative clauses in a group of 14 Hebrew-speaking children with moderate to profound hearing impairment, aged 7;8-11;3, compared to a control group of normal-hearing children, aged 7;5-11;0. The hearing-impaired participants either avoided producing a sentence with syntactic movement by using resumptive pronouns in relative clauses, or produced ungrammatical sentences (in addition to that, in the part of the experiment testing comprehension, they understood correctly relative clauses with resumption). Out of the grammatical object relatives produced, 69% (35/51) contained a resumptive pronoun. Although ORs with resumption are grammatical in Hebrew, they are usually used by younger children (Varlokosta & Arlom-Lotem, 1998). The TD children of the control group produced a lower percentage of ORs with resumption (32%).

As regards SRs production, the hearing impaired participants produced only 67/84 (79,8%) correct SRs, whereas TD children produced all SRs correctly, with the exception of three sentences. According to the authors, the problematic production of ORs and the consistent number of ungrammatical sentences both in ORs and SRs production documented a difficulty experienced by hearing impaired children in producing sentences with syntactic movement. Also the comprehension task administered in the same study had revealed their deficit with relative clauses derived by movement of the object.

In a study of 2008, Friedmann and colleagues elicited relative clauses in a group of 14 hearing impaired children, aged 7;7-11;3, and a control group of 28 children aged 7;5-11;0. In SRs production, the main error type of the hearing-impaired children was the use of a resumptive pronoun in the highest subject position (7%).

Combining the SRs produced when the target was a SR or an OR, the hearing impaired children doubled the relative head 3% of times and used a resumptive pronoun in the subject position 8% of times. On the other hand, the control participants produced less than 2% of their subject relatives with a resumptive pronoun (5/280), and did not make any doubling errors.

The hearing impaired children also found ORs production problematic: in many cases they either produced an OR with a resumptive pronoun (42%), they avoided the OR by turning it into a SR (6%) or by using a sentential complement (10%), or they tried to utter an OR but ended up with ungrammatical sentences (24%). The correct production of gap OR was attested at 19%, whereas TD children of the control group totally produced 64% of correct gap ORs and 30% of ORs with resumptive pronoun. The main error types in ungrammatical sentences produced by hearing impaired children were: head omission (69), use of the wrong resumptive pronoun (70), complementizer omission, SR with a change of the head (71) and ungrammatical utterances.

(69) Hayiti roce lihiot Se-saba ma'axil oto.

Would-1sg-past want to-be that-grandpa feeds him.

'I would like to be that grandpa feeds him.'

(70) Ani raciti lihiot yeled Se-ha-kelev melakek oti.

I wanted to-be child that-the-dog licks me.

'I wanted to be a child that the dog licks me.'

(71) Ani raciti lihiot safta Se-malbisha oti

I wanted to-be grandma that-dresses me

'I wanted to be grandma that dresses me.'

Target: I want to be the girl that grandma dresses

I.IV.VI Different accounts for the use of resumptive pronouns in typical and atypical development

The reliance on resumptive pronouns has been interpreted by many linguists (Shlonsky, 1992; Varlokosta & Armon-Lotem, 1998; Novogrodsky and Friedmann, 2006; Friedmann et al., 2008) as a saving device used by children acquiring syntax when wh-movement is impaired or blocked, failing “to yield a grammatical output” (Shlonsky, 1992: 443). Since Chomsky (1977), it has been widely assumed that resumptive pronouns are generated as a last resort operation which are recruited in order to save an illicit structure. In 1991, Chomsky related the use of resumption to principles of economy, claiming that “last resort operations are language-specific rules that come into play *only* when operations general to Universal Grammar are blocked” (Shlonsky, 1992: 447).

According to Labelle (1990), the more natural way to account for the resumptive strategy in RCs production is that there is no WH-movement at all. An analysis postulating WH-movement in resumptive RCs would not account for the fact that French-speaking children never use resumption in questions. A question as in (72) is never attested in child production.

(72) * Quelle balle est-ce qu’il la lance?

Which ball is he throwing it?

The author explained the use of resumptive pronouns and DPs by considering RCs in child production as predicative sentences, which have to contain an element having the same index as the antecedent. The resumptive pronoun / DP works as the element of the clause coindexed with the antecedent, as in (73), taken from Labelle (1990).

(73) [La balle]_i [que le garçon la_i lance].

Novogrodsky and Friedmann (2006) and Friedmann et al. (2008) concentrate on wh-movement impairment in SLI and hearing impaired children respectively, showing that the heavy reliance on resumptive pronouns both in comprehension and production is a consequence of the block of movement, related to their language

impairment. The authors based their assumptions on Hornstein's (2001) account for resumptive pronouns: these are not lexical elements selected at the beginning of the syntactic derivation, but they are added during the course of computation, in order to save a derivation that would be otherwise illicit. This is the case of relativization into a Strong Island: the computational system recognizes that the derivation is about to crash and introduces a resumptive pronoun in the launching site of movement. According to Novogrodsky and Friedmann (2006) and Friedmann et al. (2008), resumptive pronouns are recruited not only in Strong Islands, when wh-movement is not available even in unimpaired speakers, but also when wh-movement is blocked in cases of language impairment.

Crucially, impaired children insert a resumptive pronoun not only in object positions, but also in subject positions. According to the authors, "this constitutes perhaps even stronger evidence that it is the blocking of movement, due to the impairment, that causes the insertion of resumptive pronouns and licenses it. The production of a subject relative with a resumptive pronoun in embedded subject position is not grammatical, and is not included in the linguistic input that these children encounter [...]. However, a deficit that relates to A-bar movement blocks movement in this environment too, and yields the insertion of a resumptive pronoun" (Friedmann et al., 2008: 21).

Nevertheless, according to Shlonsky (1992), the block of movement is not the only condition for the reliance on resumption as a saving mechanism: it is necessary that the language under consideration allows pronouns to be used resumptively, that is, to be variables at LF. This explains the parametric distinction between languages accepting resumption (Hebrew, Palestinian, Irish, Modern Greek..) and languages refusing it a standard option to build RCs (Italian, French, Spanish...). Children might use resumption to form RCs even when this option is illicit in the grammar of their language, because they are yet exploring the several possibilities given by UG before fixing the language-specific parameter.

Moreover, the frequent doubling of the relative head, occurring almost exclusively in impaired children's production, might be taken as a support of the Copy Theory of Movement (Chomsky, 1995, 2000, 2001), which suggests that movement is a creation of a copy of the moved constituent, rather than displacement of that constituent. The identification of such linguistic phenomenon as "movement" is due to phonological restrictions that let only the upper copy to be pronounced. As

a consequence, we do not see the lower copy, which however is pronounced in the speech of impaired children, providing a rare look into this linguistic mechanism. In line with this theory, Belletti (2005) accounted for resumption in children's relative clauses by suggesting that movement consists of two steps: copy + deletion. Within the raising analysis of relative clauses, deletion is *total* in gap RCs, *partial* in RCs with resumptive pronouns, and *absent* in RCs containing resumptive DPs.

A different account for resumption was proposed by McKee and McDaniel (2001), in a research on the acquisition of English relative clauses. In English, the distribution of resumptive pronouns is affected by extractability, that is, resumptives are in complementary distribution with traces, appearing only where traces are illicit. Consider the examples in (74) and (75), taken from McKee and McDaniel (2001: 115).

(74) *a* That's the girl that I like *t*.

b *That's the girl that I like *her*.

(75) *a* *That's the girl that I don't know what *t* did.

b That's the girl that I don't know what she did.

Within the framework of the Minimalist program (Chomsky, 1993), two structures deriving from the same set of lexical items can be in complementary distribution. The two derivations compete with one another so that the least costly operation is finally spelled out blocking the other one. According to McKee and McDaniel (2001), each resumptive-trace pair like the ones in (74) and (75) originates from the same numeration. In line with Kayne (1981), they suggest that resumptives are Spell-Outs of traces. "Up to the point of Spell-Out, the two derivations would be identical; they would both involve movement leaving a trace. In most cases, the trace would not be spelled out as a resumptive, because a derivation with this extra step would be more costly than without it" (McKee and McDaniel, 2001: 115). However, in cases like (75) the trace is illicit for a principle of grammar. In these cases, the only possible derivation is the one with resumptive pronoun (75b) which is spelled out despite its cost. As regards full DPs resumption, the authors suggest to treat them as speech errors, since they are not present in English adult grammar and, in their experiment, occurred more in extractable cases than in unextractable ones. "When

the production system is about to floundering or losing track of the filler-gap relation, the head of the relative clauses is repeated, taking the form of a full resumptive NP” (*ibidem*: 144). However, we do not agree with this last consideration, since relative clauses with full resumptive DPs are attested in an adult language, Kombai (Cinque, 2011), which has both an external head and a noun corresponding to the head within the relative clause. It seems to us that children are exploring the different options given by UG, choosing in their early attempts the computationally least costly operation.

I.V Why do children avoid object relative clauses? Different accounts for the same linguistic phenomenon

I.V.I De Vincenzi's (1991) Minimal Chain Principle and Friedmann, Belletti and Rizzi's (2009) Relativized Minimality

The difficulties encountered by children when comprehending/producing ORs compared to the ceiling performance in SRs have been recently accounted for by two different theories: De Vincenzi's (1991) Minimal Chain Principle (MCP) and Relativized Minimality, RM (Friedmann, Belletti, Rizzi, 2009).

According to the MCP, a speaker/hearer begins to build a constituent structure representation of a sentence as soon as he/she encounters the first words. When the syntactic processor has to choose between different structures to end the sentence, it will prefer the shortest chain. Indeed, the MCP is sensible to chain length and prefers structures with shorter dependencies which are less difficult to compute, as SRs (1) compared to ORs (2). In the case of SRs, after the Italian complementizer *che* (that), the parser begins to build the shortest chain available in syntax by inserting the trace into the preverbal position.

To sum up, the comprehension of SRs is easier because the chain that the parser has to process between the relativized DP and its trace is shorter and thus not so costly as in ORs.

(1) Il papà che _ bacia i gatti.

[DP Il papà_i] [CP che [IP [DP t_i] bacia i gatti]]

(2) L'elefante che i nonni guardano _

[DP L'elefante_i] [CP che [IP i nonni guardano [t_i]]]

Another explanation of the asymmetry between SRs and ORs has been proposed by Friedmann, Belletti and Rizzi (2009). In a study on Hebrew children aged 3;7-5, they showed that the degree of complexity in ORs was due to the type of element intervening between the moved constituent and its trace. The participants found it more difficult to produce ORs with a lexical DP as the subject of the RC (3), whereas ORs with impersonal *pro* (4) or free relatives (5) were easier to produce.

(3) La maestra che i vigili salutano.

The teacher that the policemen are greeting.

(4) La maestra che salutano.

The teacher that (they/someone) are greeting.

(5) Chi salutano i vigili.

Whom the policemen are greeting.

The authors explained the increasing difficulty encountered by children in ORs with lexical DPs in terms of Relativized Minimality (Rizzi, 1990; Starke, 2001), a principle of locality claiming that the local relation between X and Y is blocked when an intervening element (Z) occurs between the two positions, as in (6).

(6) X..... Z..... Y
Il bambino_i che il papà saluta t_i

In SRs, no potential candidate intervenes between the moved element and its trace, whereas it does in ORs. Children who do not fully master RCs may have some difficulties in assigning the correct thematic roles to elements sharing the same morpho-syntactic features in long distance dependencies. This means that children's immature computational resources are not able to correctly interpret the relation between the head of an OR and its trace when a lexically restricted DP intervenes between the two positions. Therefore, children opt for other strategies, such as SRs, declarative clauses, or passive object relatives.

I.V.II Collins' (2005) approach to the passive construction

Studies on Italian RCs (Guasti and Cardinaletti 2003; Utzeri, 2006; Volpato, 2010; Contemori, 2011) show that adults avoid to produce ORs by transforming the targeted structures into SRs by passivizing the verb (PORs, Belletti, 2009a). Children avoid the relativization of the object as well, also adopting PORs instead of ORs at very high percentages (in our experiment, children produce 408 PORs, corresponding to 29% out of the total amount of items).

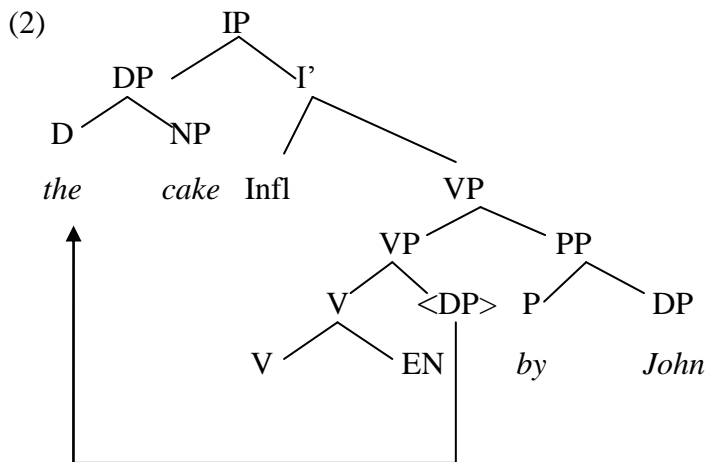
The benefit of using passive object relatives instead of object relative clauses, has been accounted for as the possibility to avoid the intervention effect caused by a lexically restricted NP between the moved object and its trace, which would give raise to Relativized Minimality (Friedmann, Belletti and Rizzi, 2009).

To account for the use of passive object relatives in children and adult production, Collins' (2005) approach to passive construction has been adopted. In his theory, Collins rejected the analysis of the passive given in the Principles and Parameters tradition and based his theoretical assumptions more on *Syntactic Structures* (Chomsky, 1957). Importantly, he thought that a problem of the Principles and Parameters treatment of the passive was the different position held by the external argument DP (*John* in example 1) in the active sentence (Spec, IP) and in the passive (complement of *by*). Instead, he suggested an analysis where the external argument of the passive stands in the same position as the external argument of the active sentence.

(1a) John ate the cake.

(1b) The cake was eaten by John.

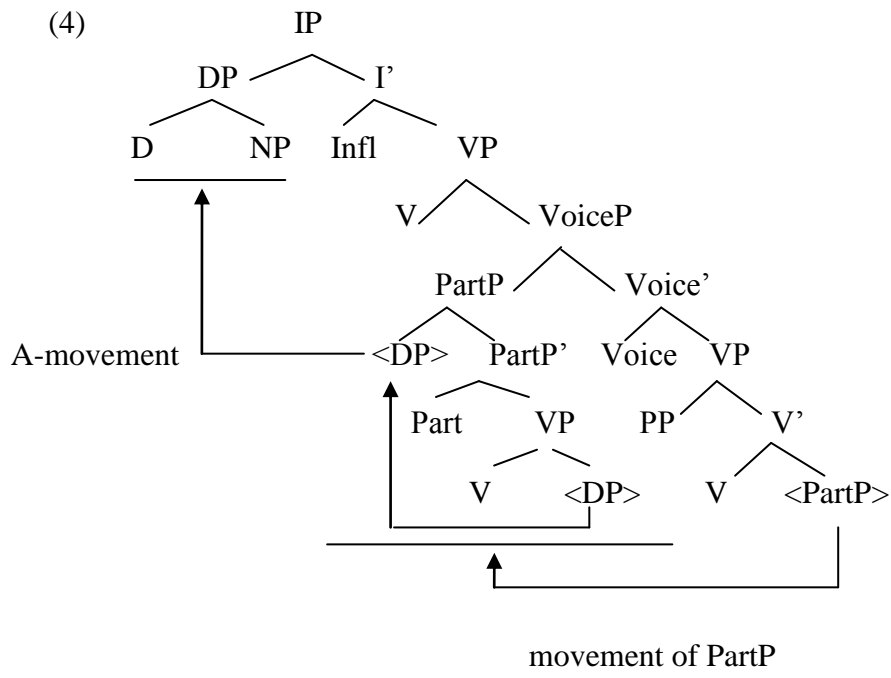
In the Principles and Parameters tradition, the suffix *-en* is itself an argument which absorbs case and the external (agent) theta role (Chomsky 1982: 124, Baker 1988, Jaeggli 1986, Roberts 1987, Baker, Johnson, Roberts 1989, and many others). In the case of (1b), the suffix *-en* absorbs the accusative case of the verb *eat* and the external agent theta role. The DP [_{DP} the cake] raises to [Spec, IP], in order to be assigned Case. Importantly, the position in [Spec, IP] has been left available by the external argument, which does not need to move to receive Case, since this was already absorbed by the suffix *-en*. The structure of the passive sentence in (1b) is presented in (2) (taken from Collins, 2004: 2).



However, the preposition *by* cannot assign a theta role. So, the question made by Collins (2004, 2005), is how the post-verbal DP *John* is assigned a theta role in the passive construction. The need of a theta role assignment to the DP is shown by some examples in (3), taken from Collins (2004).

- (3) a. The cake was eaten by John.
 b. It was believed by everybody that Mary was a thief.
 c. Danger was sensed by John.
 d. A black smoke was emitted by the radiator.
 e. That professor is feared by all students.
 f. Mary was respected by John.

In (3a), John is an agent, whereas in (3b-f) the complement of the preposition *by* is not an agent, but rather it varies according to the meaning of the verb, suggesting that *by* cannot assign a theta role to its complement. Collins (2004, 2005) rejected the idea that the suffix *-en* would absorb Case and theta role from the verb, and proposed that the external argument is merged into the same position in both active and passive sentences: into [Spec, VP]. In order to avoid Minimality effects between elements of the same featural class, a Smuggling operation is supposed to occur within the VP projection. Indeed, the external argument merged in [Spec, VP] blocks the movement of the direct object to a higher position. According to Collins (2005), Smuggling of the Verb + Object projection (VP) lets the object (in PartP) move to a higher position, namely the specifier of the VoiceP projection, headed by the preposition *by*. From this position, the object can move to a still higher landing site, the specifier of IP (see figure 4), causing no Minimality effects.



CHAPTER II

Language acquisition in children affected by Developmental Dyslexia

Developmental dyslexia (DD) is a specific reading disability that has a neurobiological origin (Grigorenko, 2001) and is associated with deficits in the phonological component of language. Indeed, the most accepted account for this life-long persistent disorder is the *phonological theory* (Ramus et al., 2003; Wiseheart et al., 2009), according to which “dyslexics have a specific impairment in the representation, storage and/or retrieval of speech sounds” (Ramus et al., 2003: 2). In a study on 16 DD English-speaking adults, Ramus and colleagues (2003) found that all participants had a phonological deficit, whereas 10 of them had an auditory deficit, 4 a motor deficit and 2 a magnocellular deficit. These findings might support the authors’ claim that a phonological impairment is the cause of dyslexia, which can also arise in the absence of other deficits. Moreover, the study seems to show that a large proportion of dyslexics also suffer from additional auditory, visual or motor disorders.

The importance of early phonemic awareness and sensitivity to the phonological structure of words for reading development was already attested by Elbro (1996). According to the author, children are at risk of failing to learn to read if they do not acquire in a certain period of time an adequate level of phonemic awareness, phonemic discrimination and phonemic short term memory. Indeed, the level of phonological awareness in the pre-school years is predictive of success/failure in the children’s ability to read, a finding which has been corroborated by several cross-linguistic studies (for Italian: Cossu, Shankweiler, Liberman, Katz & Toal 1988; for English: Mann & Liberman 1984; Bryant et al. 1989; Catts 1991; for French: Alegria, Pignot & Morais 1982; for Swedish: Lundberg et al.1980; for Danish: Lundberg et al. 1988). In addition, a number of experiments have shown that games based on phonemes manipulation help pre-school children in developing their reading abilities (Bradley & Bryant 1985; Lundberg et al. 1988, a. o.). At the same time, weaknesses in phonemic awareness have been found in adult dyslexics, in spite of their fluent reading ability and practice (Pratt & Brady 1988; Fowler & Scarborough, 1993). Interestingly, there is no evidence that dyslexics have problems in natural sounds discrimination (Brady et al., 1983); therefore, their difficulties are

exclusively related to the discrimination and identification of speech sounds, more specifically of phonemes. In this respect, a number of studies have shown that dyslexic and normal readers are significantly different in their ability to identify /ba/ - /da/ - /ga/ syllables dispersed on a continuum (Andersen & Spliid 1986; Werker & Tees 1987), and dyslexic adults need more time to distinguish /sta/ than /sa/ syllables (Steffens et al., 1992). According to Elbro (1996), phoneme discrimination is “a ‘front end’ component in the phonological system, hence, poor discrimination may have detrimental effects on several other components and result in reduced distinctness of phonological representations. Indistinct representations are probably more difficult to remember, to recall and to articulate than distinct representations. Hence, phoneme discrimination may, at least theoretically, contribute indirectly through other phonological processes to differences in reading acquisition” (Elbro, 1996: 6).

The studies quoted so far tend to attribute poor readers’ comprehension difficulties with certain spoken sentences to an impairment in the processing of phonological material rather than to a failure or difficulty in comprehend complex syntactic structures (Shankweiler et al., 1992). According to Crain and Shankweiler (1990), DD children’s problems in comprehension may be related to a limitation in the phonological memory. Indeed, many authors attribute the comprehension deficits of DD children to inefficient or inadequate phonological representations available in the working memory (Snowling et al., 1988; Shankweiler et al., 1992; Gotardo et al., 1996), since the efficiency of short term memory also depends on the quality of the phonological system, that is of the phonological representations stored and systematically retrieved in the mental lexicon (Fowler, 1991; Brady, 1991). As outlined by Wiseheart and colleagues (2009), “a bottleneck in lower-order phonological processing systems limits the transfer of linguistic information to higher-order syntactic parsing systems, resulting in impaired comprehension”.

Recently, psycholinguistic investigations have demonstrated a more general impairment in DD children and adults, affecting not only phonology but also other areas of language development, such as vocabulary and morpho-syntax. According to Tunmer and colleagues (1987; 1988) and Tunmer and Hoover (1992), for instance, the phonological impairment is part of a more general information processing deficit; also the development of syntactic awareness plays a role for reading development. Similarly, Leikin and Bouskila (2004) found a worse performance in DD children in

some linguistic tasks, such as sentence correction, grammaticality judgments and word ordering.

Scarborough (1990) followed the language development of 32 children of dyslexic parents, from 2;6 years of age to the second grade at school. At the end of the second grade, 20/32 of these children turned out to be dyslexics. The author outlined in the group of DD children consistent difficulties already at 2;6 years in several aspects of language development: the pronunciation of consonant clusters, but also the length and syntactic complexity of their utterances. At 5 years, the children with DD diverged in tasks of expressive vocabulary, letter naming and phonological awareness. The author's conclusion was that dyslexia is like a permanent underlying weakness which affect various areas of language development.

The auditory comprehension of passives and relative clauses have been investigated in several studies on English-speaking DD children (Bar-Shalom, Crain, & Shankweiler, 1993; Byrne, 1981; Crain & Shankweiler, 1990; Mann, Shankweiler, & Smith, 1984; Shankweiler et al., 1995; Smith, Macaruso, Shankweiler & Crain, 1989) and have been found to be affected. More recently, in a study of 2000, Waltzman and Cairns reported that the comprehension of sentences with pronouns related to principle B of the Binding theory was impaired in dyslexic children. Errors in past tense marking were documented by Joanisse, Manis, Keating, and Seidenberg (2000), while Rispens, Roeleven and Koster (2003b) found much more agreement errors in the marking of verbs in spontaneous speech of DD children than in typically developing children. Another important study in verb morphology was the one conducted by Rispens and colleagues (2004), who found a reduced sensitivity to subject-verb agreement violations in an auditory judgment task administered to dyslexic school-age children.

Despite all these findings in the domain of morpho-syntax, Wiseheart and colleagues (2009) interpreted a worse comprehension of passive sentences and center embedded RCs than right-branching RCs in a group of dyslexic adults as a further demonstration of the *phonological processing limitations hypothesis* (Shankweiler et al., 1992). According to them, the WM has to process much more information with passive sentences and embedded RCs, since these kinds of syntactic structures violate canonical syntactic order more significantly than right branching RCs.

The comprehension of relative clauses and passive sentences was also tested also by Cardinaletti & Volpato (2011), who compared the performance of 10 Italian-

speaking dyslexic adults to unimpaired age-matched controls, a group of unimpaired adolescents and another group of TD children. In the task on relative clauses, the dyslexic adults performed worse than age-matched controls in all types of relatives (SRs, ORs, ambiguous RCs), and in ORs comprehension they had an intermediate performance between adolescents and children. Interestingly, in ambiguous RCs with plural subject like “*Mi piacciono i bambini che lavano i papà*” (“I like best the children that are washing the fathers”), they performed even worse than children (93% compared to 97%). On the contrary, all dyslexic participants performed at ceiling in passive sentences with actional verbs, whereas only three DD adults showed a worse performance with non actional verbs (83%), confirming previous findings for different populations in other languages (Maratsos et al. 1985, Driva and Terzi 2008).

A tendency which is becoming more and more widespread in the linguistic and psycholinguistic field is the interpretation of the morpho-syntactic difficulties documented in dyslexic children independently from the phonological deficits. Indeed, some authors have suggested that the mechanism responsible for dyslexics’ syntactic limitations is related to the grammatical system (Byrne, 1981; Waltzman & Cairns, 2000; Rispens et al., 2004).

Guasti (2013) tried to account for the fact that considerable syntactic limitations are normally documented only in a subgroup of dyslexic children. An heterogeneity was detected, for instance, in the sample of DD children participating to Rispens and colleagues’ (2004) auditory judgment task, and was attributed by the authors to “varying degrees of speech perception and phonological processing abilities” (Rispens et al., 2004: 345). Guasti (2013) proposed a different explanation, namely that these differences in task performance are related to an overlap with Specific Language Impairment, that is usually present only in a subgroup of children affected by dyslexia. To corroborate her hypothesis she administered a set of tasks to different groups of DD children, in order to assess phonological, morpho-syntactic, semantic and pragmatic skills. A non-word repetition task was administered to 39 DD children with a mean age of 12;3 and 39 chronological age (CA) controls; the results revealed that 51% of the DD children had problems in the processing of phonological material. To assess the morpho-syntactic abilities, she administered a test of elicited

production of 3rd person direct object clitics¹ to 24 children with DD with a mean age 9;2, and 24 CA matched controls with a mean age 9;3. She found that DD children produced less clitics than CA controls (65% vs 90%). However, looking at individual data, a different pattern emerges, with some DD children showing a good competence in clitic pronouns, and a subgroup of them (25%) producing clitics only in 20% of their utterances. As regards syntactic competence, she administered an elicitation task of subject and object *wh*-questions, half introduced by *who* and half by *which*-NP (Guasti, Branchini and Arosio 2012), to a subset of the participants of the task on clitics, 18 children with DD with a mean age 9;4, and 18 CA matched controls with the same mean age. Results showed that *which*-NP questions were more problematic for all participants, and 21% of the DD children produced significantly less *which*-NP questions than controls (the same DD children had no problems with *who*-questions). Since *which*-questions involve pied-piping of the NP, Guasti (2013) conclude that 20% of the DD children were affected by a movement-impairment which arises in the formation of non-canonical sentences. Finally, semantic and pragmatic competence was assessed through a task adapted from Katsos and Smith (2010), administered to the same children who took part at the task on clitics. DD children, exactly as the controls, did not show any impairment in semantic and pragmatic competence, since they easily understood sentences with quantifiers or requiring the generation of scalar implicatures. The conclusion drawn by the author is that linguistic impairments in the oral skills of DD children do exist, and present an interesting overlap with children affected by SLI: indeed, about 20% of the DD children showed an impairment both in morpho-syntax (clitic pronouns) and syntax (*which*-NP questions), whereas none of them presented problems in semantics and pragmatics (less impaired also in SLI), showing that not all linguistic components are affected in dyslexia. The author leaves to future research the choice between three possible explanations: either DD and SLI are on a continuum and differ in terms of severity (Tallal et al. 1997), or they are separate disorders that may appear in the same child due to comorbidity (Catts et al. 2005), or the diagnosis of

¹ Clitic pronouns, which involve both morpho-syntactic and pragmatic skills (they provide case, gender and number information; their placement depends on the finite nature of the verb, and they pragmatically refer to a discourse topic) are particularly significant, since their acquisition has been shown to be affected in Italian SLI children at 5 years (Bortolini et al., 2006) and still at 7 years (Arosio et al., 2010).

dyslexia has to be used only for phonological limitations, whereas SLI children present both phonological and cognitive impairments (Bishop and Snowling, 2004).

Difficulties with direct object clitics have been reported also by Zachou et al. (2012), who tested the production and comprehension of direct object clitics and definite articles in 10 Italian-speaking children with DD (mean age: 9;0). The children with DD performed significantly worse in clitics production (75% vs 96%) and comprehension (74% vs 97%), compared to controls. Despite a quite good performance, they also differ significantly in definite articles production (94% vs 100%), particularly with the plural masculine form *li*, which is normally impaired also in SLI children (Leonard et al., 1993), whereas they did not differ in the comprehension of definite articles (93% vs 98%).

In conclusion, over the last years the linguistic research has investigated the underlying mechanism which causes dyslexia, trying to understand the various areas of language affected by this pathology. Indeed, the most recent experiments on Italian (Cardinaletti & Volpato, 2011; Guasti, 2013; Zachou et al., 2012, a. o.) and other languages (Rispens et al., 2004, a. o), have already shown that comprehension of complex syntactic structures, like RCs or clitic pronouns, are partially affected in dyslexics, and that the production of some morpho-syntactic (clitics) and syntactic structures (*which*-NP questions) is also impaired. Future aims of the linguistic research should be to further investigate the acquisition of syntax in dyslexia, both in production and comprehension, and to understand to what extent this pathology overlaps with other language impairments. It is still to determine, for instance, whether the cognitive deficits of some dyslexic children/adults are attributable to dyslexia itself or to an overlapping with Specific Language Impairment.

CHAPTER III

THE EXPERIMENT

III. I The elicitation task

III.I.I Participants

The participants were 116 typically developing (TD) children aged 6-10, a group of 7 children with a diagnosis of developmental dyslexia (DD), of which 6 children had a mean age of 8;06 and another child was 11;03; a group of 7 children with suspected, undiagnosed DD with a mean age of 7;9 (who had evident school difficulties), and a control group of 10 adults with a mean age of 23;8 (see tables 1 and 2).

Table 1. Description of the TD children and controls

Age groups	N° of participants	Mean age
G1 (6 – 6;11)	19	6;06
G2 (7 – 7;11)	33	7;04
G3 (8 – 8;11)	27	8;05
G4 (9 – 10;04)	37	9;06
G5 (19 - 30)	10	23;8

Table 2. Description of the participants with DD (diagnosed/undiagnosed)

Type of impairment	N° of participants	Age	Mean age
Suspected DD	7	6;06 - 9;07	7;09
Diagnosed DD	6	8;03 – 9;09	8;6
Diagnosed DD	1	11,03	

Children were recruited in three elementary Venetian schools. All of them were native speakers of Italian, living in Venice or Mestre. Some of them also speak the Venetian dialect at home with their parents.

The Italian-speaking adults were University students with a good cultural background, living in Venice, Mestre or Padua. Most of them speak the Venetian or Paduan dialect. We excluded an adult because she produced 5 relative clauses with “*in cui/dove*” instead of the correct complementizer “*che*” when an OR was targeted,

which is a common error in the production of very young children or language impaired children.

III.1.II Materials and method

We elicited subject and object relative clauses adapting and slightly modifying the Preference Production Task designed by Friedmann and Szterman (2006) and Novogrodsky and Friedmann (2006) for Hebrew and often used for experiments on Italian (Utzeri, 2006, 2007; Belletti and Contemori, 2010, 2012; Volpato, 2010; Contemori and Garraffa, 2010; Contemori, 2011). Differently from Belletti and Contemori (2010) and Contemori (2011), we administered the elicitation task to older children, aged 6-10, in order to collect new data on the acquisition of Italian restrictive relative clauses. Moreover, differently from all the studies on Italian quoted so far, we included two task modifications to the Preference task originally designed by Novogrodsky and Friedmann (2006): we only used a mismatch condition to elicit relative clauses in order to avoid the production of ambiguous sentences, and we compared our data on typical development to children with dyslexia and suspected dyslexia, a kind of comparison which was not previously made on Italian.

Two pictures were presented to the child on a laptop screen, showing different characters performing the same action (change of agent condition), or the same characters performing two different actions on a patient (change of action condition). The child had to choose one of the two options, telling the experiment which character he/she liked best. Since the child was told to answer beginning with “I like best...”, he/she was forced to produce a relative clause to complete the sentence in the most felicitous way.

Compared to the Preference Task designed by Friedmann and Szterman (2006) and Novogrodsky and Friedmann (2006), we included two task modifications in order to make the discourse context more felicitous:

- each character involved in the event was introduced before presenting the relevant picture, and
- we constantly changed the head of the RC, avoiding to have one and the same head for each item (the previous tasks always used *il bambino/la bambina* - the child - as the head of the target RC).

By doing so, we avoided to topicalize the head of the target RC, giving the same discourse saliency to each character. With these task modifications, we hoped to collect a higher number of ORs (since a topicalized head could bring the child to produce more SRs), and a lower number of the demonstrative pronoun *quello* (“the one”) instead of a lexical NP as head of the RC, since the referent was different for each targeted sentence.

There were 24 items per participant, twelve eliciting subject relative and twelve eliciting object relative clauses. The order of the subject and object relative target sentences was randomized. Totally, we tried to elicit 6 subject relative clauses (SRs) with a change of patient condition and 6 SRs with a change of action condition; 6 object relative clauses (ORs) with a change of agent and 6 ORs with a change of action condition.

All the target sentences were semantically reversible and contained animate noun phrases. We decided to use only a mismatch condition in order to prevent the child from producing ambiguous RCs like “*Mi piace il papà che sporca il bambino*” (“I like best the father who is soiling the child), which in Italian can be interpreted either as subject or object RCs.

We used the following transitive, actional verbs: *lavare, sporcare, salutare, visitare, baciare, fermare, inseguire, toccare, sollevare, guardare, mordere, accarezzare, catturare, sgridare, premiare, pettinare, tirare, mandare via* (to wash, to soil, to greet, to attend, to kiss, to halt, to chase, to touch, to lift up, to look at, to bite, to caress, to capture, to scold, to reward, to comb, to pull, to chase away).

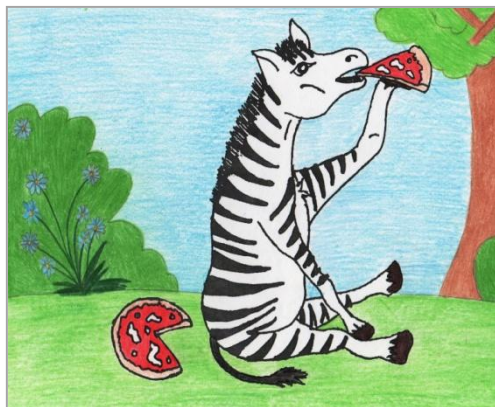
The child was presented a Power Point Presentation with drawings and video-tape recorded voice of a puppet eliciting the target sentence. Each session was tape-recorded and later transcribed. He/she was tested in a quiet room at school, no time limit and no feedback was given by the experimenters. Before beginning the experimental sessions, we presented the puppets to the whole classroom, explaining the children the main characteristics of the game. Adults were tested at home or at University in a quiet room, they were given no feedback and no time limit as well as children.

In the same task, we forced the production of 6 subject and 6 object wh-questions, 12 subject and 12 object cleft sentences and 12 passive sentences. We also included 12 fillers, which consisted in very simple questions like (1), and were used to prevent the child from adopting learning strategies or losing concentration during

the experimental session. The elicitation task was divided in two sessions, lasting approximately 25/30 minutes each.

- (1) PUPPET: “*Che cosa fa la zebra?*” “What is the zebra doing?”
TARGET: “*(La zebra) mangia la pizza*” “(The zebra) is eating pizza”

Fig. 1



SRs were elicited in two different conditions: 6 SRs presented a change of action condition (2), whereas other 6 SRs were elicited in a change of patient condition (3).

- (2) PUPPET: “Ci sono due dottori e due nonne. Un dottore saluta le nonne, l’altro dottore visita le nonne. Quale dottore ti piace?”
EXPERIMENTER: “Inizia con “mi piace...””
TARGET: (Mi piace) il dottore che visita / saluta le nonne.

PUPPET: “There are two doctors and two grandmothers. A doctor is greeting the grandmothers, the other doctor is attending the grandmothers. Which doctor do you like?”

EXPERIMENTER: “Start with “I like...””

TARGET: (I like) the doctor that is greeting / attending the grandmothers.

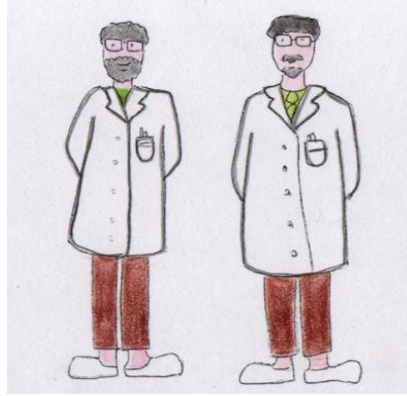


Fig. 2



Fig. 3



Fig. 4



Fig. 5

(3) PUPPET: “Ci sono due vigili, due cani e due leoni. Un vigile ferma i cani, l’altro vigile ferma i leoni. Quale vigile ti piace?”.

EXPERIMENTER: “Inizia con “mi piace...””.

TARGET: (Mi piace) il vigile che ferma i leoni / i cani.

PUPPET: “There are two traffic policemen, two dogs and two lions. A policeman is halting the dogs, the other policeman is halting the lions. Which policeman do you like?”.

EXPERIMENTER: “Start with “I like...””.

TARGET: (I like) the policeman that is halting the dogs / the lions.

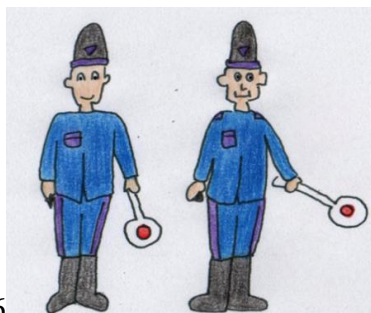


Fig. 6

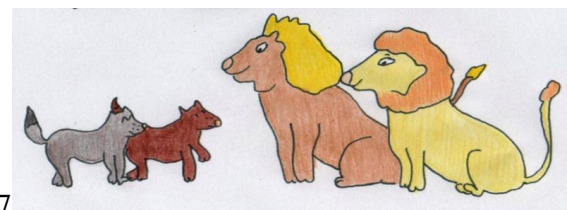


Fig.7



Fig. 8



Fig. 9

ORs were elicited in two different conditions: 6 ORs in a change of agent condition (4), and 6 ORs in a change of action condition (5).

(4) PUPPET: “Ci sono due bambini, due barbieri e due cani. I bambini pettinano un cane, i barbieri pettinano l’altro cane. Quale cane ti piace?”.

EXPERIMENTER: “Inizia con “mi piace ...”.

TARGET: (Mi piace) il cane che pettinano i bambini / i barbieri.

PUPPET: “There are two children, two hairdressers and two dogs. The children are combing one dog, the hairdressers are combing the other dog. Which dog do you like?”.

EXPERIMENTER: “Start with “I like...”.

TARGET: (I like) the dog that are combing the children / the hairdressers.



Fig.10



Fig.11

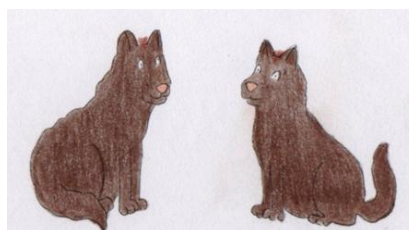


Fig. 12



Fig. 13



Fig. 14

In this condition, the child was expected to produce a post-verbal subject within the RC, since the focus is on the different characters performing the action, rather than on the event. A null or preverbal subject would have been pragmatically wrong.

(5) PUPPET: “Ci sono due nonni e due elefanti. I nonni sollevano un elefante e guardano l’altro elefante. Quale elefante ti piace?”.

EXPERIMENTER: Inizia con “mi piace ...”.

TARGET: Mi piace l’elefante che (i nonni) sollevano / guardano.

PUPPET: “There are two grandparents and two elephants. The grandparents are lifting up one elephant and are staring at the other elephant. Which elephant do you like?”.

EXPERIMENTER: “Start with “I like...”.

TARGET: (I like) the elephant that (the grandparents) are lifting up / staring at.

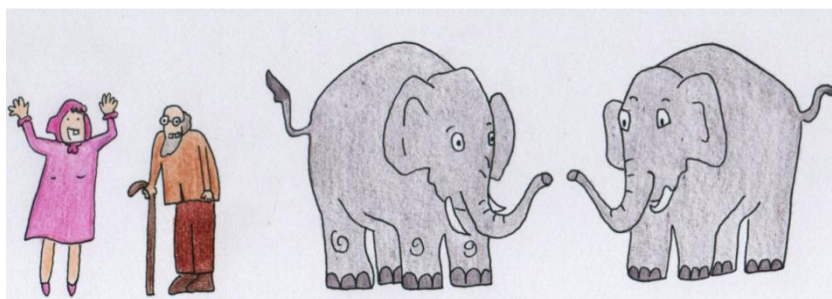


Fig. 15



Fig. 16



Fig. 17

In this condition, the child was expected to produce a null or a preverbal subject, since the focus is on the event, rather than on the agents (who are the same in the two pictures). Therefore, a post-verbal subject would have been pragmatically wrong.

Compare our task instructions in (2-5) with the following ones, taken by Novogrodsky and Friedmann (2006) (6) and Utzeri (2006) (7), which was the first study on Italian RCs production elicited with the Preference Task:

(6) There are two children. The father combs one child, the barber combs another child. Which child would you rather be? Start with “I would rather be...” or “The child that..”.

TARGET: (hayiti ma’adif lihiot) ha-yeled she-ha-aba mesarek
 (would-1sg prefer to-be) the-child that-the father combs
 “(I would rather be) the child who the father combs”.

(7) “Ci sono due bambine. La mamma sta baciando una bambina, il nonno sta baciando un’altra bambina. Quale bambina preferiresti essere? Inizia con “(preferirei essere) la bambina che...”.

“There are two children. The mother is kissing one child, the grandfather is kissing another child. Which child would you rather be? Start with “(I would rather be) the child that...”.

TARGET: La bambina che la mamma sta baciando.
 The child that the mother is kissing.

As shown in (6) and (7), the previous experiments adopting the Preference Task always used one and the same head, *il bambino/la bambina* (the child), and also included in the task a match condition with two singular animate NPs. In (7), the

presence of a preverbal subject disambiguates the RC, indicating that *la bambina* is the NP extracted from an OR. However, with a post-verbal subject as in (8), which is very common strategy in children's production, the sentence would be ambiguous, having both a subject and an object interpretation.

(8) “*Mi piace la bambina che sta baciando la mamma*”.

I like best the child that is kissing the mother.

III.I.III Coding

As regards SRs production, we counted as correct those subject relative clauses with a gap in the first merge position of the extracted subject constituent, having either a lexical NP (9) or the demonstrative pronoun *quello* (10) as head of the RC.

(9) “*Mi piace il bambino che saluta le mucche*”. (8;00)

I like best **the child** that is greeting the cows.

TARGET: (Mi piace) il bambino che saluta le mucche / i cani.

(I like) the child that is greeting the cows / the dogs.

(10) “**Quello** che saluta i cani”. (6;04)

The one that is greeting the dogs.

TARGET: (Mi piace) il bambino che saluta le mucche / i cani.

(I like) the child that is greeting the cows / the dogs.

We also counted as correct those SRs with an object clitic pronoun instead of a lexical NP as complement of the verb inside the RC, either with a lexical NP or with *quello* as head of the RC, as in (11) and (12) respectively:

(11) “*Mi piace il dottore che **le** visita*”. (9;07)

I like best the doctor that them-CLIT_{female plur} is attending.

TARGET: (Mi piace) il dottore che visita / saluta le nonne.

(I like) the doctor that is attending / greeting the grandmothers.

(12) “*Quella che **li** sgrida*”. (6;06)

The one that them-CLIT_{male plur} is scolding.

TARGET: (Mi piace) la maestra che premia / sgrida i bambini.

(I like) the teacher that is awarding / scolding the children.

On the other hand, we decided to count as incorrect those SRs with *object drop*, as in (13), and we considered ungrammatical SRs with subject resumption (14), since resumption is not accepted in Italian as standard strategy to form relative clauses.

(13) “Quello che visita”. (9;07)

The one that is attending.

TARGET: (Mi piace) il dottore che visita / saluta le nonne.

(I like best) the doctor that is attending / greeting the grandmothers.

(14) “A me piace quello che il bambino saluta le mucche”. (8;03)

I like the one that the boy is greeting the cows.

TARGET: “(Mi piace) il bambino che saluta le mucche / i cani”.

(I like) the boy that is greeting the cows / the dogs.

Other typologies of sentences collected when a SR was elicited were: an OR instead of a SR (15), a SR with head inversion (16), a substitution of the complementizer *che* (that) with a wh-filler such as *dove/quando/in cui* (where/when/in which) (17), a relative clause missing the relative head (18) (coded as (S)VO), an ungrammatical sentence (19), or a SR with an incorrect object clitic pronoun (20), which was also coded as “ungrammatical”.

(15) “Quello che i bambini lo tirano”. (7;03)

The one that the children it-CLIT_{male sing} are pulling.

TARGET: (Mi piace) il leone che insegue / tira i bambini.

(I like) the lion that is chasing / pulling the children.

(16) “Mi piacciono i bambini che tirano il leone”. (8;08)

(I like) the children that are pulling the lion.

TARGET: (Mi piace) il leone che insegue / tira i bambini.

(I like) the lion that is chasing / pulling the children.

(17) “Quello dove visita le nonne”. (7;11)

The one where (he) is attending the grandmothers.

TARGET: (Mi piace) il dottore che visita / saluta le nonne.

(I like) the doctor that is attending / greeting the grandmothers.

(18) “Che saluta le nonne”. (6;05)

That (he) is greeting the grandmothers.

TARGET: (Mi piace) il dottore che visita / saluta le nonne.

(I like) the doctor that is attending / greeting the grandmothers.

(19) “I vigili che ferma i cani”. (7,01)

The policemen that is halting the dogs.

TARGET: (Mi piace) il vigile che ferma i leoni / i cani.

(I like) the policeman that is halting the lions / the dogs.

(20) “Mi piace quello che lo visita”. (10;00)

I like the one that it-CLIT_{male sing} is attending.

TARGET: (Mi piace) il dottore che visita / saluta le nonne.

(I like) the doctor that is attending / greeting the grandmothers.

As regards ORs production, we counted as correct those with a gap in the position of the extracted object constituent, either with a lexical DP (21) or *quello* (22) as relative head, whereas we did not include ORs with a resumptive clitic pronoun (23) or a resumptive DP (24) located in the position where a gap is required. Indeed, even if resumptive object relative clauses are attested in Italian-speaking children's early production and adults' informal speech, resumption is not a standard strategy to form relative clauses in Italian. Therefore, we decided to count this type of ORs as incorrect.

(21) “Mi piace il gatto che stanno accarezzando i bambini”. (9;11)

I like the cat that are caressing the children.

TARGET: (Mi piace) il gatto che (i bambini) accarezzano/mandano via.

(I like) the cat that (the children) are caressing/chasing away.

(22) “Quella che stanno baciando i cani”. (8;05)

The one that are kissing the dogs.

TARGET: (Mi piace) la bambina che stanno baciando i nonni / i cani.

(I like best) the child that are kissing the grandparents/the dogs.

(23) “Mi piace il cane che lo lavano”. (7;00)

I like the dog that (they) it-CLIT_{male sing} are washing.

TARGET: (Mi piace) il cane che (i papà) lavano/sporcano.

(I like best) the dog that (the fathers) are washing/soiling.

(24) “Quella che i bambini guardano la scimmia”. (6;06)

The one that the children are looking at the monkey.

TARGET: (Mi piace) la scimmia che guardano i bambini/i gatti.

(I like best) the monkey that are looking at the children/the cats.

Moreover, we also found passive object relatives (PORs, Belletti, 2009a) (25), the use of *wh*-fillers such as *dove/quando/in cui* instead of the complementizer *che* (26-27), ungrammatical sentences, resulting from morpho-syntactic errors (28-29), and several answer typologies coded as ORs turned into subject relatives (ORs>SRs): SR with head inversion (30), SR with change of the verb (31), SR with reversed theta-roles assignment (32). Finally, we coded as “other” the following answer typologies: passive causative constructions with the reflexive verb *farsi* (33), relative clauses missing the relative head (34), (S)VO sentences (35).

(25) “Mi piace il cane che viene pettinato dai barbieri”. (8;00)

I like the dog that is being combed by the hairdressers.

TARGET: “(Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) the dog that are combing the children/the hairdressers.

(26) “Quello dove i vigili salutano la maestra”. (7;04)

The one where the policemen are greeting the teacher.

TARGET: (Mi piace) la maestra che i vigili salutano/fermano.

(I like) the teacher that the policemen are greeting/halting.

(27) “Mi piace quando gli orsi accarezzano il bambino”. (7;03)

I like when the bears are caressing the child.

TARGET: (Mi piace) il bambino che gli orsi mordono/accarezzano.

(I like) the child that the bears are biting/caressing.

(28) “Quello che gli orsi li accarezzano”. (6;11)

The one that the bears them-CLIT_{male plur} are caressing.

TARGET: (Mi piace) il bambino che gli orsi mordono/accarezzano.

(I like) the child that the bears are biting/caressing.

(29) “A me piace quella che sono baciando i nonni”. (8;05)

I like best the one that *ESSERE*_{3° PL PERSON} kissing the grandparents.

TARGET: (Mi piace) la bambina che baciano i cani/i nonni.

(I like) the girl that are kissing the dogs/the grandparents.

(30) “I gatti che guardano la scimmia”. (7;03)

The cats that are looking at the monkey.

TARGET: (Mi piace) la scimmia che guardano i gatti/i bambini.

(I like) the monkey that are looking at the cats/the children.

(31) “Il vigile che scappa dai cani”. (7;01)

The policeman that is running away from the dogs.

TARGET: “(Mi piace) il vigile che i cani mordono/inseguono”.

(I like) the policeman that the dogs are biting/chasing.

(32) “Quello che tocca i topi”. (7;01)

The one that is touching the mice.

TARGET: (Mi piace) il cavallo che toccano i topi/le scimmie.

(I like) the horse that are touching the mice/the monkeys.

(33) “Mi piace il cavallo che si fa toccare dalle scimmie” (7;08)

I like the horse that has itself touched by the monkeys.

TARGET: (Mi piace) il cavallo che toccano i topi/le scimmie.

(I like) the horse that are touching the mice/the monkeys.

(34) “Che guardano l’elefante”. (6;05)

That (they) are looking at the elephant.

TARGET: (Mi piace) l’elefante che i nonni guardano/sollevano.

(I like) the elephant that the grandparents are looking at/lifting up.

(35) “Mi piace che i bambini pettinano il cane”. (6;08)

I like that the children are combing the dog.

TARGET: (Mi piace) il cane che pettinano i bambini/barbieri.

(I like) the dog that are touching the children/the hairdressers.

III.II The repetition task

III.II.I Participants

The participants were the same of the elicitation task, with the exclusion of one child (aged 7;01). In total, we tested 115 TD children aged 6-10, divided into 4 groups according to age: 19 children with a mean age of 6;06; 32 children with a mean age of 7;04; 27 children with a mean age of 8;05; 37 children with a mean age of 9;06, and a control group of 10 adults with a mean age of 23;08 (see table 1).

Moreover, we administered the repetition task to 6 DD children with a mean age of 8;06; one DD child aged 11;03; 7 children with suspected DD, that is with evident school difficulties, with a mean age of 7;09 (see table 2).

Table 1. Participants of the repetition task: TD children and control.

AGE GROUPS	N° OF PARTICIPANTS	MEAN AGE
6 - 7	19	6;06
7 - 8	32	7;04
8 - 9	27	8;05
9 -10	37	9;06
adults	10	23;8

Table 2. Participants of the repetition task: non TD children.

Type of impairment	N° of participants	Age	Mean age
Suspected DD	7	6;06 - 9;07	7;09
Diagnosed DD	6	8;03 – 9;09	8;6
Diagnosed DD	1	11,03	

III.II.II Materials and method

We elicited the repetition of 32 sentences plus 5 filler sentences, in order to compare the elicited production of some of the targeted structures (object cleft sentences, object relative clauses and passive sentences) with the results collected in the elicitation task. We did not include wh-questions because they would have been difficult to interpret, due to their ambiguity between the subject/object interpretation

(indeed, they could be interpreted as subject or object wh-questions according to the intonation or to various strategies adopted by children in elicited production, such as cleft object wh-question with preverbal subject, like “*Chi è che il papà lava?*”, which can be interpreted only as a question on the object).

We presented the child a Power Point Presentation with the same drawings of the elicitation task, in order to provide him or her with the appropriate discourse context and thus to make the task felicitous. The participant was told that Pippo, one of the puppet acting out during the elicitation task, tried to make the same game done by children, and he recorded itself. Now he/she had to listen carefully to Pippo, count to 3 with a loud voice and then repeat exactly the sentence produced by the puppet. We decided to ask the child to count to 3 out loud, in order to avoid a mere repetition of the sentence just heard. Indeed, counting permits the child to store the sentence in the working memory and to reconstruct it.

In figures (1) and (2) we report an example of the task: the child saw both pictures but heard only the option preferred by the puppet (1). We included both pictures in order to make the task felicitous. Otherwise, the child would have to repeat a preference between two events, without seeing the picture discarded by the puppet.

(1) PUPPET: “Mi piace la tigre che vedono i bambini”.

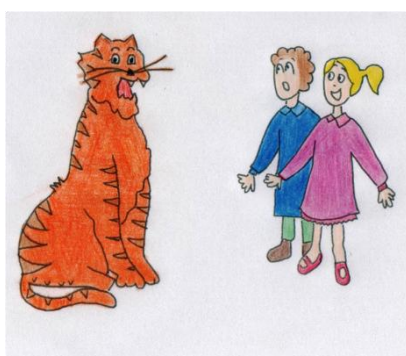


fig. 1



fig. 2

Each child was tested in a quiet room at school. Children enrolled at the first grade of elementary school made the repetition task during a third session, whereas older children were tested immediately after the second session. There was no time-limit and no feedback was given by the experimenters.

The child was given another option if he/she couldn't hear the sentence well; otherwise, we went on even if the sentence produced was wrong. Sometimes we

interrupted the task giving the child some awards, like stickers, in order to avoid the lost of concentration.

The participants were tape-recorded and the sessions were later transcribed.

III.II.III Coding

We counted as correct those sentences which had the same syntactic construction as the targeted ones: namely, ORs with change of agent (2) and ORs with change of action (3). Since we wanted to focus on the children's ability to reconstruct the relative clause from a syntactic point of view, we also included those ORs with lexical substitutions (4).

(2) "Mi piace il cane che pettinano i barbieri".

I like best the dog that are combing the hairdressers.

(3) "Mi piace il bambino che gli orsi accarezzano".

I like best the child that the bears are caressing.

(4) "Mi piace il gatto che i bambini **fermano**". (9;11)

I like best the cat that the children are halting.

TARGET: "Mi piace il gatto che i bambini **mandano via**".

I like best the cat that the children are chasing away.

In the repetition of ORs with post-verbal subject as in (2), we identified several incorrect typologies of answer. The most frequent one was the transformation of the OR into a SR with a third person singular subject instead of a third person plural one, and a correctly inflected verb (5) (coded as "theta-roles inversion"):

(5) "Mi piace il cane che pettina i barbieri". (6;04)

I like the dog that is combing the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

Other typologies of answer were: (S)VO sentences (coded as “other”) (6), ungrammatical sentences (7), OR>SR through head inversion (8), ORs with a preverbal instead of a post-verbal subject (9), ORs with a plural head instead of a singular one (coded as “opposite mismatch”) (10), PORs with the auxiliary *venire* plus a by-phrase (11), or reduced PORs plus a by-phrase (12) (both coded as “PORs”). Some children also produced incomplete sentences or just gave up (coded as “other”) (13).

(6) “Mi piace che pettina i barbieri”. (7;01)

I like that (it) is combing the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

(7) “Mi piace i cani che pettina i barbieri”. (7;03)

I like the dogs that is combing the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

(8) “Mi piacciono le mamme che tirano su l’elefante”. (7;03)

I like best the mothers that are raising up the elephant.

TARGET: Mi piace l’elefante che sollevano le mamme.

I like the elephant that are lifting up the mothers.

(9) “Mi piace la scimmia che i gatti guardano”. (7;01)

I like best the monkey that the cats are looking at.

TARGET: Mi piace la scimmia che guardano i gatti.

I like the monkey that are looking at the cats.

(10) “Mi piacciono i cani che pettina il barbiere”. (7;03)

I like the dogs that is combing the hairdresser.

TARGET: Mi piace il cane che pettinano i barbieri.

(I like) the dog that are combing the hairdressers.

(11) “Mi piace l’elefante che viene sollevato dalle mamme”. (10;00)

I like best the elephant that is being combed by the mothers.

TARGET: Mi piace l'elefante che sollevano le mamme.

I like the elephant that are lifting up the mothers.

(12) "Mi piace il cane pettinato dai barbieri". (8;08)

I like best the dog combed by the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

(13) "Mi piace il cavallo che che ... non me lo ricordo". (6;06)

I like best the horse that ... that ... I don't remember any more".

TARGET: Mi piace il cavallo che toccano le scimmie.

I like the horse that are touching the monkeys.

In the repetition of ORs with preverbal subject as in (3), we indentified the following incorrect typologies of answer: OR>SR through head inversion (14-15); (S)VO sentences (16), ungrammatical sentences (17); ORs with a plural head instead of a singular one, plus a singular subject within the RC (18), which preserves a mismatch condition between the head and the subject of the RC, or a plural subject as in the targeted sentence (19) (both coded as ORs with plural head).

(14) "Mi piacciono gli orsi che accarezzano il bambino". (7;09)

I like the bears that are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(15) "Mi piace l'orso che sta accarezzando il bambino". (7;04)

I like the bear that is caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(16) "Mi piacciono gli orsi accarezzano il bambino". (6;08)

I like the bears are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(17) “Mi piace il vigile che il cane mordono”. (6;07)

I like the policeman that the dog are biting.

TARGET: Mi piace il vigile che i cani mordono.

I like the policeman that the dogs are biting.

(18) “Mi piacciono i vigili che il cane morde”. (7;03)

I like the policemen that the dog is biting.

TARGET: Mi piace il vigile che i cani mordono.

I like the policeman that the dogs are biting.

(19) “Mi piacciono gli elefanti che i nonni sollevano”. (6;08)

I like the elephants that the grandparents are lifting up.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

Moreover, another possible answer was the transformation of the targeted OR into a SR with an incorrect theta-roles assignment (20), and with the complement of the verb located in a preverbal position (21) (we coded both as “theta-roles inversion”).

(20) “Mi piace il bambino che accarezza gli orsi”. (6;07)

I like the child that is caressing the bears.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(21) “Mi piace l’elefante che i nonni solleva”. (6;07)

I like the elephant that the grandparents is caressing.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

We also found ORs with a post-verbal subject instead of a preverbal one (22), with a null subject (23), with a clitic resumptive pronoun (24), or the resumption of

the whole DP, either with a null subject (25) or with an overt subject (26) (both coded as DP resumptive ORs).

(22) “Mi piace la maestra che fermano i vigili”. (7;00)

I like the teacher that are halting the policemen.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

(23) “Mi piace il gatto che mandano via”. (6;08)

I like the cat that (they) are chasing away.

TARGET: Mi piace il gatto che i bambini mandano via.

I like the cat that the children are chasing away.

(24) “Mi piace il cane che i papà lo sporcano”. (7;00)

I like the dog that the fathers it-CLIT_{male sing} are soiling.

TARGET: Mi piace il cane che i papà sporcano.

I like the dog that the fathers are soiling.

(25) “Mi piace il vigile che mordono il vigile”. (6;05)

I like the policeman that (they) are biting the policeman.

TARGET: Mi piace il vigile che i cani mordono.

I like the policeman that the dogs are biting.

(26) “Mi piace il bambino che gli orsi accarezzano il bambino”. (6;11) (child with suspected dyslexia)

I like the child that the bears are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

Finally, some passive object relatives with by-phase (27) were produced. We coded as “other” all the incomplete answers containing just the beginning of the targeted sentence as in (28), or any attempt resulting in the child’s decision to give up.

(27) “Mi piace che il vigile viene morso dai cani”. (8;05) (child with diagnosed dyslexia)

I like that the policeman is being combed by the dogs.

TARGET: Mi piace il vigile che i cani mordono.

I like the policeman that the dogs are biting.

(28) “Mi piace il bambino che”. (7;03)

I like the child that ...

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

CHAPTER IV

RESULTS

IV. I The elicitation task

In the next sections, we present the results of the elicitation task, divided per type of elicited relative clause (SRs vs ORs) in typical / atypical development. Moreover, we present our data on the nature of the head (demonstrative pronoun *quello* vs lexical DP) in SRs and ORs, and the nature (null/overt) and distribution of the embedded subjects (preverbal/post-verbal) in gap and resumptive ORs.

IV.I.I Elicited production of SRs in typical and atypical development

Results confirmed the well-known and marked asymmetry between SRs and ORs production attested in previous studies on Italian (Guasti & Cardinaletti, 2003; Utzeri, 2006, 2007; Belletti and Contemori, 2010; Volpato, 2010; Contemori and Garraffa, 2010, 2013; Contemori, 2011; Guasti et al., 2012) and cross-linguistically (English: Hamburger and Crain, 1982; McKee et al., 1998; French: Guasti & Cardinaletti, 2003; Labelle, 1990; Hebrew: Novogrodzsky & Friedmann, 2006; Friedmann et al., 2008; Greek: Stavrakaki, 2001; Swedish: Håkansson & Hansson, 2000; Basque: Gutierrez-Mangado and Ezeizabarrena, 2012, among many others). While children find it difficult to produce ORs and adults systematically avoid them using alternative structures, all the participants produced a very high percentage of SRs, almost 100% (see table 1). Our results confirmed that Italian-speaking children master SRs production at least from the age of 6, showing no differences between age groups.

table 1: total amount of SRs produced by each age group and adults

AGE GROUPS	TOT SRs
G1 (6;6)	97%
G2 (7;4)	98%
G3 (8;5)	97%
G4 (9;6)	98%
G5 (23;8)	98,4%

The small percentage of errors in the group of adults (1,6%; 2 sentences) was due to the misunderstanding of the event described in the following pictures (fig.1-2), when the subject relative in (1) was targeted. (2) and (3) are the wrong sentences produced by two adults; both of them used a passive object relative instead of a subject relative, interpreting the DP “*il leone*” (the lion) in the second picture as the patient rather than the agent of the event.



Fig. 1



Fig. 2

(1) (Mi piace) il leone che insegue / tira i bambini.
 (I like) the lion that is chasing / pulling the children.

(2) Mi piace il leone che viene tirato dai bambini. (29)
 I like the lion that is being pulled by the children.

(3) Mi piace di più il leone tirato dai bambini. (19)
 I like best the lion pulled by the children.

As regards the production of typically developing children, they made different types of errors when a SR was targeted, exemplified in (4-13). Results with percentages are illustrated in table 2.

- Relative clauses with the interrogative adverbs *dove/quando/in cui* (where, when, in which) instead of the complementizer *che* (that):

(4) “L’orso dove insegue i gatti”. (7;11)
 The bear where (it) is chasing the cats.
 TARGET: (I like) the bear that is chasing the cats/the lions.

(5) “Mi piace la maestra quando sgrida i bambini”. (9;02)

I like the teacher when (she) is scolding the children.

TARGET: (I like) the teacher that is scolding/awarding the children.

(6) “Mi piace la bambina in cui saluta i cavalli”. (10;01)

I like the girl in which (she) is greeting the horses.

TARGET: (Mi piace) la bambina che guarda/saluta i cavalli.

(I like) the girl that is looking at/greeting the horses.

- Gap object relative clauses (coded as “ORs”):

(7) “Mi piace quella che premiano i bambini”. (6;07)

I like the one that the children are awarding.

TARGET: “(Mi piace) la maestra che premia i bambini”.

(I like) the teacher that is awarding the children

- Resumptive object relative clauses (coded as “ORs”):

(8) “Quello che i bambini lo tirano”. (7;03)

The one that the children it-CLIT_{masc sing} are pulling.

TARGET: “(Mi piace) il leone che tira i bambini”.

(I like) the lion that is pulling the children.

- Subject relative clauses with object drop:

(9) “Quella che premia”. (7;03)

The one that is awarding.

TARGET: “(Mi piace) la maestra che premia i bambini”.

(I like) the teacher that is awarding the children.

- Ungrammatical sentences:

(10) “I vigili che ferma i cani”. (7;01)

The policemen that is halting the dogs.

TARGET: (Mi piace) il vigile che ferma i cani.

(I like) the policeman that is halting the dogs.

- Subject relative clauses with omission of the complementizer *che* (coded as “other”):

(11) “Mi piace il bambino saluta i cani”. (7;06)

I like the child is greeting the dogs.

TARGET: “(Mi piace) il bambino che saluta i cani”.

(I like) the child that is greeting the dogs.

- Subject relative clauses with theta-roles inversion (“other”):

(12) “Mi piace i bambini che stanno tirando il leone”. (8;09)

I like the children that are pulling the lion.

TARGET: (Mi piace) il leone che tira i bambini.

(I like) the lion that is pulling the children.

- Subject relative clauses with omission of the relative head (“other”):

(13) “Che saluta le nonne”. (6;05)

That is greeting the grandmothers.

TARGET: (Mi piace) il dottore che saluta le nonne.

(I like) the doctor that is greeting the grandmothers.

table 2. Answer typologies with percentages in TD children when a SR was targeted

AGE GROUPS	SRs	obj drop	ORs	che>dove/quando/in cui	ungramm	other
G1 (6;6)	97%	0,4%	1%	0%	0%	2%
G2 (7;4)	98%	0,8%	0,25%	1,0%	0,25%	0%
G3 (8;5)	97%	0,3%	0%	0,3%	1,8%	1%
G4 (9;6)	98%	0,2%	0,7%	1,3%	0,20%	0%

An interesting pattern emerges comparing TD children’s production with the results of children with diagnosed or suspected dyslexia (see table 3).

Interestingly, the group of diagnosed dyslexics and the older dyslexic child, aged 11;03, produced the same percentage of subject relative clauses as TD children (98% and 100%, respectively). Suspected dyslexics also performed above chance in SRs, though the percentage of correct SRs was a bit lower (90%).

Children with atypical development, both diagnosed and suspected dyslexics, also produced some SRs with NP resumption (see examples 14 and 15), which were totally absent in the production of TD children. This pattern has been already attested in impaired populations by Novogrodsky and Friedmann (2006) for children with Specific Language Impairment and Friedmann et al. (2008) for hearing-impaired children.

Table 3. Results in the groups of children with diagnosed/suspected dyslexia when a SR was elicited

non TD children	SRs	DP resumption	incomplete	SVO
diagnosed dyslexics	98%	1%	1%	0%
suspected dyslexics	90%	2%	5%	2%
dyslexic child (11;03)	100%	0%	0%	0%

(14) “A me piace **quello** che **il bambino** saluta le mucche”. (8;03)

I like **the one** that **the boy** is greeting the cows.

TARGET: “(Mi piace) il bambino che saluta le mucche”.

(I like) the boy that is greeting the cows.

(15) “**Quella** che **la bambina** saluta i cavalli”. (7;01)

The one that **the girl** is greeting the horses.

TARGET: “(Mi piace) la bambina che saluta i cavalli”.

(I like) the girl that is greeting the horses.

Moreover, children with suspected dyslexia produced a higher amount of incomplete sentences (5% against 0,14% in TD children and 1% in diagnosed dyslexics), though this type of error was produced by one and the same child. Consider examples (16) and (17) of incomplete sentences in a girl with suspected dyslexia (9;01), and example (18) found in the production of a dyslexic child (9;09):

(16) “Sporca i bambini”.

(He) is soiling the children.

TARGET: “(Mi piace) il papà che lava/sporca i bambini”

(I like) the dad that is washing/soiling the children.

(17) “Tira”.

(It) is pulling.

TARGET: “(Mi piace) il leone che tira/segue i bambini”.

(I like) the lion that is pulling/chasing the children.

(18) “Che segue i bambini”.

That is chasing the children.

TARGET: (Mi piace) il leone che tira/segue i bambini.

(I like) the lion that is pulling/chasing the children.

Finally, the production of SVO sentences instead of subject relative clauses was only found in suspected dyslexics (2% vs. 0% both in TD and dyslexic children) (see example 19).

(19) “La maestra premia i bambini”. (9;07)

The teacher is awarding the children.

TARGET: (Mi piace) la maestra che premia i bambini.

(I like) the teacher that is awarding the children.

IV.I.II The status of the head in subject relative clauses in typical and atypical development

Differently from previous studies on Italian relative clauses (Guasti & Cardinaletti, 2003; Utzeri, 2006, 2007; Belletti and Contemori, 2010; Volpato, 2010; Contemori, 2011, a. o.), we also analyzed the status of the head in the production of subject and object relative clauses, both in typical and atypical development. Italian relative clauses can be introduced either by a lexical DP or by a demonstrative pronoun as relative head (see examples 20 and 21 for SRs and ORs, respectively)².

² In our experiment, we expected to find more headed ORs, since we always used different referents for the relative head (avoiding to use “the child” for all target ORs, as in previous experiments on Italian).

- (20) a. Mi piace **la maestra** che premia i bambini.
I like the teacher that is awarding the children.
- b. Mi piace **quella** che premia i bambini.
I like the one that is awarding the children.

- (21) a. Mi piace **l'elefante** che sollevano le mamme.
I like the elephant that are lifting up the mothers.
- b. Mi piace **quello** che sollevano le mamme.
I like the one that are lifting up the mothers.

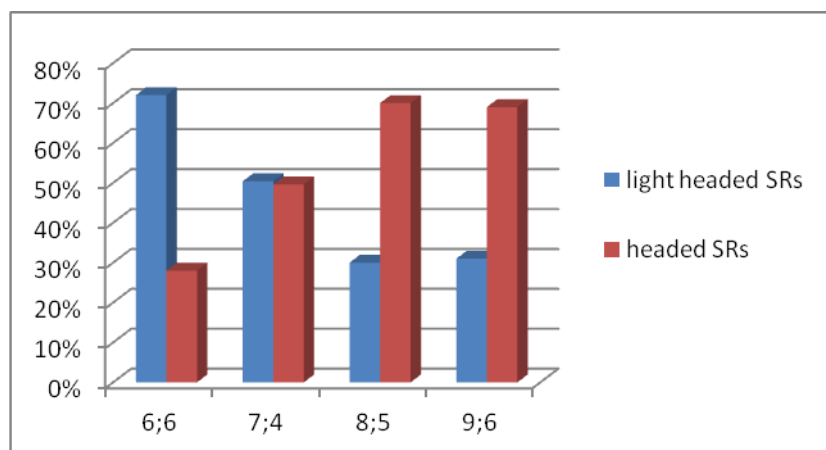
Relative clauses introduced by a demonstrative pronoun (*quello/a/i/e*), as in (20b) and (21b) are also called “light headed relatives” and are supposed to be less complex and computationally less demanding, since they involve a [DP D⁰ CP] structure, whereas headed relatives (as in 20a and 21a) may involve an extra nominal layer (Citko, 2004).

Interestingly, in our study younger TD children (mean age 6;6) show to prefer light headed subject relative clauses (72%), which constantly decrease until the age of 8 (see table 4 and fig. 3).

table 4. TD children: percentages of light headed/headed SRs out of the total amount of SRs

Age groups	light headed SRs	headed SRs
G1	72%	28%
G2	50,4%	49,6%
G3	30%	70%
G4	31%	69%

Fig. 3. Percentages of light headed/headed subject relatives in TD children per each age group



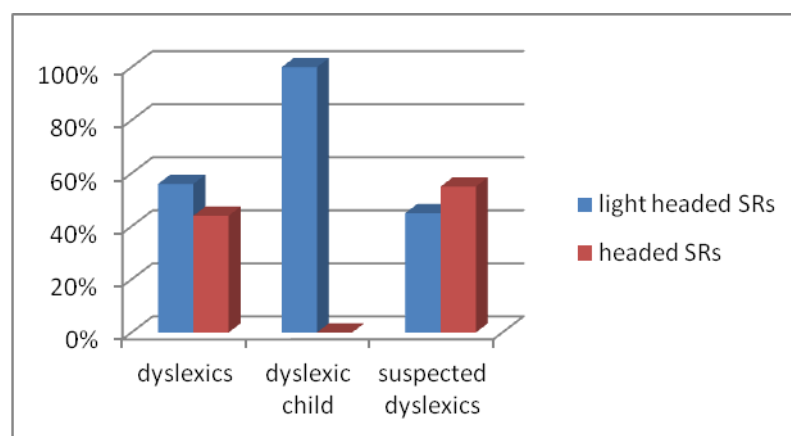
As regards the group of diagnosed dyslexics (with a mean age of 8;06), they had a very similar performance to that of 7-year-old TD children: they produced 44% of headed subject relatives (31/70) and 56% (39/70) of light headed subject relatives, showing a slight preference for the use of the demonstrative pronoun. Interestingly, the dyslexic child aged 11;03 only produced light headed subject relatives (12/12).

Also suspected dyslexics (mean age 7;09), had a similar performance to 7-year-old TD children: they produced 55% of headed subject relatives and 45% of light headed subject relatives, with a slight preference for lexical DPs (see table 5 and fig. 4 for dyslexic/suspected dyslexic children).

Table 5. Percentages of light headed/headed SRs in dyslexic and suspected dyslexic children

Non TD children	mean age	light headed SRs	headed SRs
dyslexics	8;6	56%	44%
dyslexic child	11;3	100%	0%
suspected dyslexics	7;9	45%	55%

Fig. 4. Percentages of light headed/headed SRs in dyslexic and suspected dyslexic children



IV.I.III Elicited production of ORs in typical development and controls

As regards ORs production in children and adults, our experiment confirmed previous findings on Italian acquisition of relative clauses: ORs are more complex and computationally more demanding syntactic structures both for children and controls, and therefore are very frequently avoided and substituted by other typologies of answers. For this reason, we found the well known and marked asymmetry between Italian SRs and ORs (Guasti & Cardinaletti, 2003; Belletti e Contemori, 2010; Contemori & Garraffa, 2010, 2013; Volpato, 2010; Contemori,

2011; Guasti et al., 2012), with TD children using a gap OR 24% of times and a resumptive OR 11% of time (see fig. 5) against 98% of SRs. To compare the performance between the age groups, we carried out a statistical analysis using the Mann-Whitney test for independent samples, which revealed that the production of subject relatives was significantly more accurate than that of object relatives in each age group of TD children and in adults (G1: $z = 9.513$, $p < 0.001$; G2: $z = 10.363$, $p < 0.001$; G3: $z = 10.878$, $p < 0.001$; G4: $z = 11.823$, $p < 0.001$; G5: $z = 2.064$, $p < 0.05$).

In all, children produced 333 gap object relatives, 168 in change-of-action and 165 in change-of-agent, out of 1392 items. As regards resumptive ORs, they produced 87 clitic resumptives (6%) and 70 DP resumptives (5%).

The percentage of ORs produced by adults is much lower (only 2 sentences, 2%), since they preferred passive object relatives, PORs (Belletti, 2009), attested at 94% of the total amount of items (see fig. 6), whereas children produced a wider range of answer typologies. Consider the examples in (22-33) of all the typologies of answers, including targeted ones, in TD children.

Fig. 5. Typologies of sentences collected in TD children when an OR was elicited.

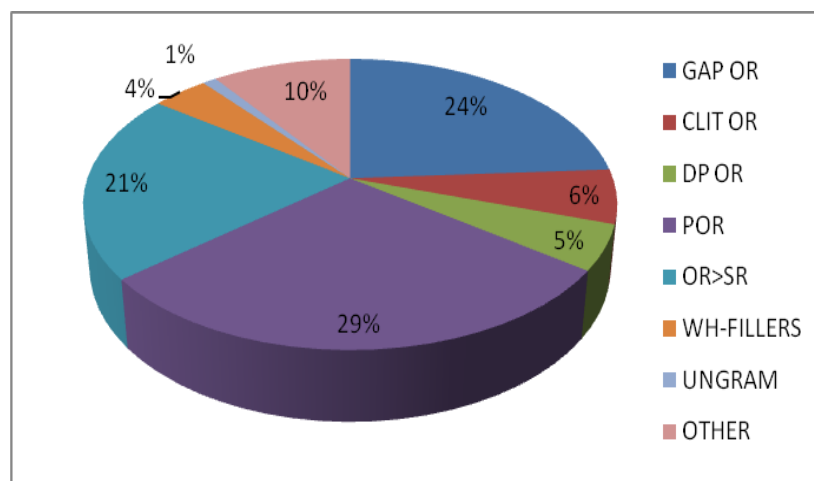
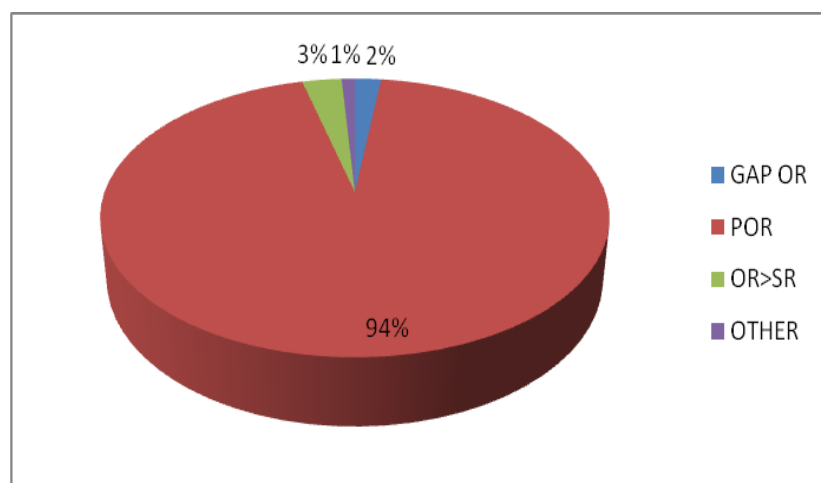


Fig. 6. Typologies of sentences collected in the control group of adults when an OR was elicited



- Gap object relative clause:

(22) “Quella che baciano i nonni”. (6;03)

The one that are kissing the grandparents.

TARGET: (Mi piace) la bambina che baciano i nonni/i cani.

(I like) the girl that are kissing the grandparents/the dogs.

- OR with resumptive clitic pronoun:

(23) “Mi piace la bambina che la baciano i cani”. (7;09)

I like the girl that her-CLIT_{fem sing} are kissing the dogs.

TARGET: (Mi piace) la bambina che baciano i nonni/i cani.

(I like) the girl that are kissing the grandparents/the dogs.

- OR with resumptive DP:

(24) “Mi piace **quella** che i bambini guardano **la scimmia**”. (7;00)

I like **the one** that the children are looking at **the monkey**.

TARGET: (Mi piace) la scimmia che i bambini guardano/salutano.

(I like) the monkey that the children are looking at/greeting.

- Passive object relative (POR, Belletti, 2009a):

(25) “Mi piace il cane che viene pettinato dai barbieri”. (8;00)

I like the dog that is being combed by the hairdressers.

TARGET: “(Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) the dog that are combing the children/the hairdressers.

- Passive causative construction “*si fa* + verb” (coded as “other”):

(26) “Mi piace il cavallo che si fa toccare dalle scimmie”. (7;08)

I like the horse that has itself touched by the monkeys.

TARGET: (Mi piace) il cavallo che toccano i topi/le scimmie.

(I like) the horse that are touching the mice/the monkeys.

- OR turned into a SR through head inversion (“OR>SR”):

(27) “I gatti che guardano la scimmia”. (7;03)

The cats that are looking at the monkey.

TARGET: (Mi piace) la scimmia che guardano i gatti/i bambini.

(I like) the monkey that are looking at the cats/the children.

- SVO sentence (“other”):

(28) “Mi piace che i bambini pettinano il cane”. (6;08)

I like that the children are combing the dog.

TARGET: (Mi piace) il cane che pettinano i bambini/barbieri.

(I like) the dog that are touching the children/the hairdressers.

- OR turned into a SR through change of verb (coded as “OR>SR”):

(29) “Il vigile che scappa dai cani”. (7;01)

The policeman that is running away from the dogs.

TARGET: “(Mi piace) il vigile che i cani mordono/inseguono”.

(I like) the policeman that the dogs are biting/chasing.

- Use of the interrogative adverbs *dove/quando/in cui* (where/when/in which) instead of the right complementizer *che* (that) (coded as “wh-fillers”):

(30) a. “Quello dove i vigili salutano la maestra”. (7;04)

The one where the policemen are greeting the teacher.

TARGET: (Mi piace) la maestra che i vigili salutano/fermano.

(I like) the teacher that the policemen are greeting/halting.

b. “Mi piace quando gli orsi accarezzano il bambino”. (7;03).

I like when the bears are caressing the child.

TARGET: (Mi piace) il bambino che gli orsi mordono/accarezzano.

(I like) the child that the bears are biting/caressing.

- OR turned into a SR through theta-roles inversion (“OR>SR”):

(31) a. “Quello che tocca i topi”. (7;01)

The one that is touching the mice.

TARGET: (Mi piace) il cavallo che toccano i topi/le scimmie.

(I like) the horse that are touching the mice/the monkeys.

b. “La tigre che vede i bambini”. (8;01)

The tiger that is looking at the children.

TARGET: (Mi piace) la tigre che vedono i bambini/i gatti.

(I like) the tiger that are looking at the children/the cats.

- Relative clause missing the relative head (“other”):

(32) “Che guardano l’elefante”. (6;05)

That (they) are looking at the elephant.

TARGET: (Mi piace) l’elefante che i nonni guardano/sollevano.

(I like) the elephant that the grandparents are looking at/lifting up.

- Ungrammatical sentence:

(33) a. “Quello che gli orsi li accarezzano”. (6;11)

The one that the bears them-CLIT_{masc plur} are caressing.

TARGET: (Mi piace) il bambino che gli orsi mordono/accarezzano.

(I like) the child that the bears are biting/caressing.

b. “A me piace quella che sono baciando i nonni”. (8;05)

I like best the one that ESSERE_{3° PL PERSON} kissing the grandparents.

TARGET: (Mi piace) la bambina che baciano i cani/i nonni.

(I like) the girl that are kissing the dogs/the grandparents.

In table 6, we report the percentages of each typology of answer produced by TD children per each age group. We also include percentages of the most frequent answer typologies coded as “other” (SVO; causative construction with “*farsi*”), and the ones included in OR>SR (head inversion; theta-roles inversion).

Table 6. Percentages of answer typologies per each age group when an OR was targeted

	GAP OR	CLIT OR	DP OR	POR	HEAD INV	WH-FILLERS	THETA-ROLES INV	SVO	OR>SR	UNGRAM	FARSI
G1	18%	7%	9%	18%	26%	0,4%	0,4%	6%	0,4%	3%	2,6%
G2	27%	10%	8%	19%	22%	6%	1,3%	0,3%	1,8%	1,5%	2,8%
G3	14%	7%	3%	41%	18%	5%	2%	1,2%	1,2%	1,5%	3,4%
G4	32%	3%	2%	36%	14%	5%	2%	0,2%	2,0%	0,2%	3,8%
TOT	24%	6%	5%	29%	19%	4%	1,6%	1,4%	1,5%	1,4%	3,2%

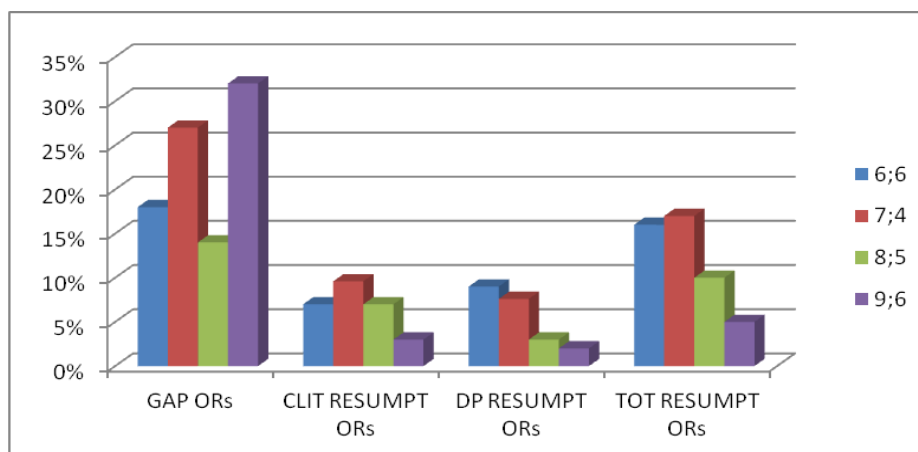
Looking at object relative production in each age group, we observed that the total amount of gap ORs increases with age (from 18% to 32%), with the exception of 8-year-olds, who produced the fewest gap object relatives (14%). A statistical analysis using the Mann-Whitney test for independent samples revealed that G4 was significantly more accurate than G2 in target ORs ($z = 3.966$, $p < 0.001$). Conversely, the total amount of resumptive object relatives decreases with age (from 16/17% to 5%), both in the case of clitic and DP resumptives, suggesting that this strategy, which is not accepted standard Italian, may be preferred by younger children.

Obviously, all groups of children, with the exception of G1, were statistically more accurate than adults in target ORs, since adults only produced 2 ORs ($G5 < G2$, $z = -2.674$, $p < 0.01$; $G5 < G3$, $z = -2.048$, $p < 0.05$; $G5 < G4$, $z = -2.143$, $p < 0.05$).

Table 7. Percentages of gap ORs and clitic/DP resumptive ORs per each age group

GROUPS	GAP ORs	CLIT RESUMPT	DP RESUMPT	TOT RESUMPT
G1	18%	7%	9%	16%
G2	27%	10%	8%	17%
G3	14%	7%	3%	10%
G4	32%	3%	2%	5%

Fig. 7. Percentages of gap and resumptive ORs per each age group



IV.I.IV The status of the head in gap and resumptive ORs in typical development

As regards the status of the head in gap object relatives, younger children showed to prefer the use of light headed relative clauses, as in the case of subject relatives. Indeed, the group of 6-year-olds totally produced 93% of gap object relative clauses with the demonstrative pronoun *quello* as relative head, as in (34). This percentage strongly decreases in older children (from 46% to 29%, see table 8, fig. 8).

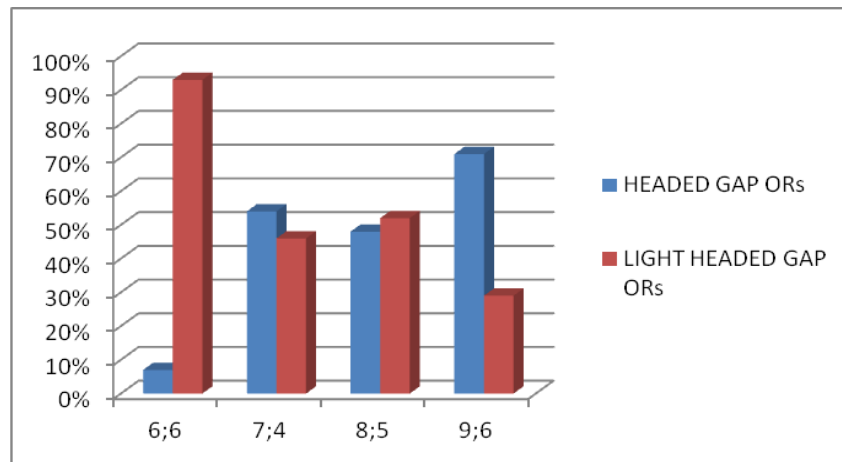
(34) “Quella che baciano i nonni”. (6;09)

The one that are kissing the grandparents.

Table 8. Percentages of headed/light headed gap ORs according to age

AGE GROUPS	HEADED GAP ORs	LIGHT HEADED GAP ORs
G1	7%	93%
G2	54%	46%
G3	48%	52%
G4	71%	29%

Fig. 8. Headed/light headed gap ORs production in each age group



In resumptive object relative clauses, children’s preference for light headed relatives is even more consistent and is not related to age. Indeed, the head of DP resumptive object relatives is always a demonstrative pronoun in each age group (35b): this means that two copies of the same DP, as in (35a), were never found (see fig. 9). At the same time, headed object relative clauses with clitic resumption (36a) are attested in a smaller extent: indeed, the use of the demonstrative *quello* in clitic resumptive ORs is always around 80% (36b) (see table 9).

(35) a. * Mi piace **il vigile** che i cani mordono **il vigile**.

I like **the policeman** that the dogs are biting **the policeman**.

b. “Mi piace di più **quello** che i cani mordono **il vigile**”. (6;11)

I like **the one** that the dogs are biting **the policeman**.

(36) a. “Mi piace **la bambina** che **la** baciano i cani”. (7;09)

I like the girl that her-CLIT are kissing the dogs.

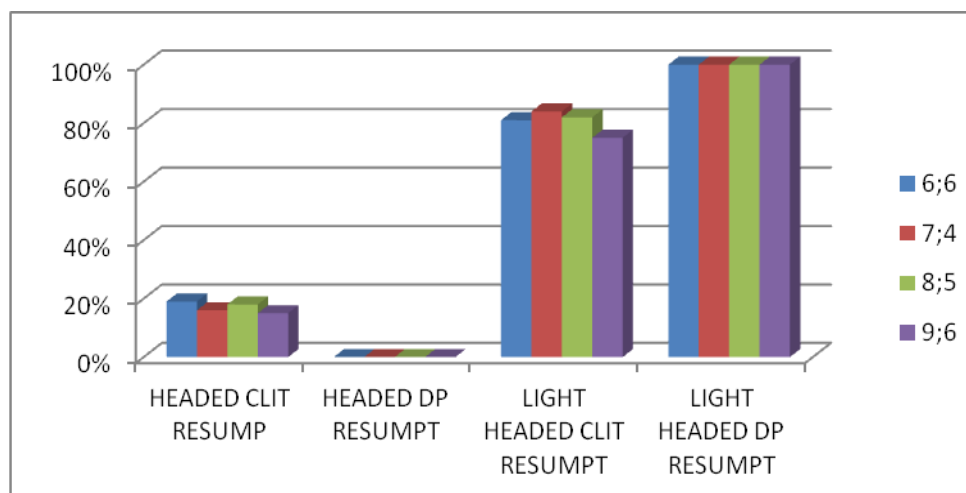
b. “Mi piace **quella** che i cani **la** baciano”. (7;00)

I like the one that the dogs her-CLIT are kissing.

table 9. Percentages of headed/light headed clitic resumptive ORs per each age group

AGE GROUPS	HEADED CLIT RESUMPT	LIGHT HEADED CLIT RESUMPT
G1	19%	81%
G2	16%	84%
G3	18%	82%
G4	15%	75%

Fig. 9. Percentages of headed/light headed object relatives with clitic/DP resumption



IV.I.V Distribution of subjects in gap and resumptive ORs in typical development

An analysis of the distribution of embedded subjects in gap object relative clauses showed that participants master the syntactic and pragmatic knowledge required to place the subject in the most suitable position according to the discourse context (see table 10). In the change of action condition, where the subject is strongly topicalized (see example 37), children correctly preferred to use preverbal (35%) or phonologically null subjects (42%). However, also post-verbal subjects are produced (24%).

(37) EXPERIMENTER: Ci sono due nonni e due elefanti. I nonni sollevano un elefante e guardano l'altro elefante. Quale elefante ti piace?

There are two grandparents and two elephants. The grandparents are lifting up one elephant and are looking at the other elephant. Which elephant do you like?

TARGET: (Mi piace) l'elefante che (i nonni) sollevano/guardano.

(I like) the elephant that (the grandparents) are lifting up/looking at.

On the other hand, in the change of agent condition, where the focus is on the agent rather than on the verb, children preferred post-verbal subjects (74%) over preverbal ones (26%), whereas null subjects, which would have been pragmatically wrong in this condition, are totally absent.

Similarly, children sometimes omitted the by-phrase in PORs only in the change of action condition (68% vs. 100%).

Table 10. Distributions of subjects in gap ORs and by-phrases in PORs

	PREV	POSTV	NULL	BY-PHRASES
CHANGE OF ACTION	58/168 35%	40/168 24%	70/168 42%	147/216 68%
CHANGE OF AGENT	43/165 26%	122/165 74%	0/165 0%	238/239 100%

In clitic resumptive ORs, as in gap ORs, null subjects (75%) exceed overt ones and preverbal subjects prevail over post-verbal subjects (see table 11) in the change of action condition. Importantly, post-verbal subjects are totally absent in this condition. This means that in clitic resumptive ORs, children produced 75% of times a sentence like the one in (38) and 25% of times a sentence as in (39), whereas a sentence like (40) was never found.

(38) Mi piace l'elefante/quello che **lo** salutano.

I like the elephant/ the one that it-CLIT_{masc sing} are greeting.

(39) Mi piace l'elefante/quello che i nonni **lo** salutano.

I like the elephant/the one that the grandparents it- CLIT_{masc sing} are greeting.

(40) * Mi piace l'elefante/quello che **lo** salutano i nonni.

I like the elephant/the one that it-CLIT_{masc sing} are greeting the grandparents.

On the other hand, in the change of agent condition children never used null subjects, as expected, but preferred preverbal subjects instead of post-verbal ones. This means that in both types of clitic resumptive ORs, preverbal subjects prevail over post-verbal ones.

Table 11. Distributions of subjects in clitic resumptive ORs and by-phrases in PORs

	PREV	POSTV	NULL
CHANGE OF ACTION	15/61 25%	0/61 0%	46/61 75%
CHANGE OF AGENT	17/26 65%	9/26 35%	0/26 0%

In DP resumptive ORs, children's preference for preverbal and null subjects in the change of action condition is confirmed. As in clitic resumptive, also in DP resumptive ORs children never used a post-verbal subject (see table 12) in change-of-action. This means that a sentence like the one in (41) was never found. On the other hand, children produced a resumptive OR like the one in (42) 79% of times, showing a strong preference for null subjects. A resumptive OR like the one in (43), with a preverbal subject, was produced 21% of times.

(41)* *Mi piace l'elefante/quello che sollevano l'elefante i nonni.*

I like the elephant/the one that are lifting up the elephant the grandparents.

(42) *Mi piace l'elefante/quello che sollevano l'elefante.*

I like the elephant/the one that (they) are lifting up the elephant.

(43) *Mi piace l'elefante/quello che i nonni sollevano l'elefante.*

I like the elephant/the one that the grandparents are lifting up the elephant.

In change-of-agent, only 2 sentences with post-verbal subjects were produced (6%), which are reported in (44) and (45). In (44), the embedded subject precedes the marginalized object, whereas in (45), the child used a kind of intonation which marginalized the post-verbal subject. This means that neither (44), nor (45) present a focalized post-verbal subject immediately after the resumption of the DP. Indeed, a sentence like the one in (46), when the post-verbal subject is not marginalized, would result awkward:

(44) “Quello che sollevano le mamme, l’elefante”. (6;06)

The one that are lifting up the mothers, the elephant.

TARGET: (Mi piace) l’elefante che sollevano le mamme/i papà.

(I like) the elephant that are lifting up the mothers/the fathers.

(45) “Mi piace quello che toccano il cavallo, le scimmie”. (7;04)

I like the one that are touching the horse, the monkeys.

TARGET: (Mi piace) il cavallo che toccano i topi/le scimmie.

(I like) the horse that are touching the mice/the monkeys.

(46) “Mi piace quello che sollevano l’elefante le mamme”.

I like the one that are lifting up the elephant the mothers.

TARGET: (Mi piace) l’elefante che sollevano le mamme/i papà.

(I like) the elephant that are lifting up the mothers/the fathers.

Table 12. Distribution of subjects in ORs with DP resumption

	PREV	POSTV	NULL
CHANGE OF ACTION	8/39 21%	0/39 0%	31/39 79%
CHANGE OF AGENT	29/31 94%	2/31 6%	0/31 0%

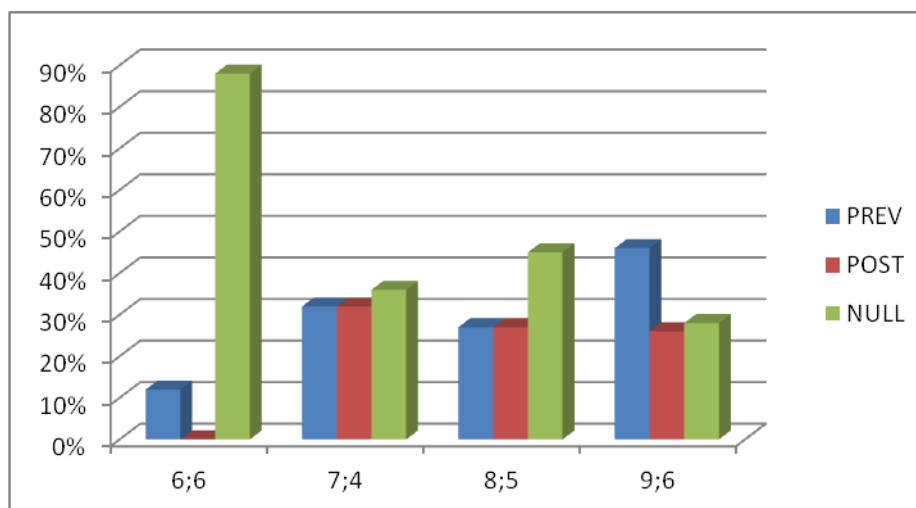
If we look at group performances, very interesting patterns emerge. In change-of-action, where preverbal and null subjects are expected, the 6-year-olds showed to have a very good knowledge of the pragmatic and syntactic competence to place the subject in the required position, since they use 12% of times a preverbal and 88% of times a null subject, and they never used post-verbal subjects here (see table 13 and fig. 10). At the same time, they omitted the by-phrase in PORs only in change-of-action (52% of by-phrases vs. 100% in change-of-agent, see tables 13 and 14). Interestingly, the 6-year-olds performed better than all the groups of older children. Indeed, the 7 and 8-year-olds produced the same amount of preverbal and post-verbal

subjects and a slightly higher amount of null subjects in the change of action condition. In the group of the 9/10-year-olds, preverbal and null subjects are predominant, but also post-verbal subjects are produced (26%), differently from the 6-year-olds.

Table 13. Distribution of subjects in gap ORs and by-phrases in PORs in change-of-action per each age group

AGE GROUPS	PREV	POST	NULL	BY-PHRASE
G1	3/25 12%	0/25 0%	22/25 88%	11/21 52%
G2	15/47 32%	15/47 32%	17/47 36%	21/41 51%
G3	6/22 27%	6/22 27%	10/22 45%	49/72 68%
G4	34/74 46%	19/74 26%	21/74 28%	66/82 80%

Fig. 10. Distribution of subjects in gap ORs in change-of-action per each age group



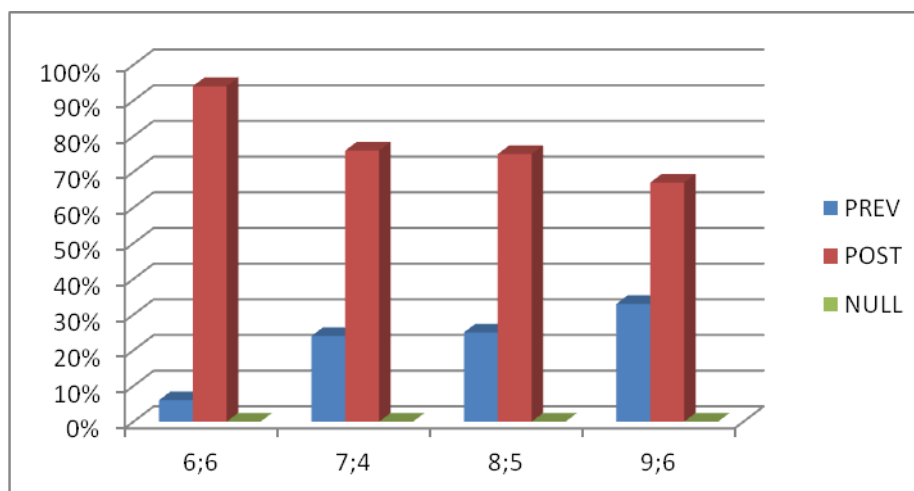
Also in change-of-agent, the 6-year-olds showed a good performance in the choice of the right position to locate the embedded subject: they strongly preferred post-verbal subjects (94% vs. 6%) and never produced null subjects. Moreover, they used a by-phrase in PORs 100% of times. The older groups never used null subjects, too, but produced a higher amount of preverbal subjects, almost the same percentage

(24%, 25%, 33%). Besides, by-phrases production in PORs was almost at ceiling, as expected (98%, 100%, 100% respectively).

Table 14. Distribution of subjects in gap ORs and by-phrases in PORs in change-of-agent per each age group

AGE GROUPS	PREV	POST	NULL	BY-PHRASE
G1	1/16 6%	15/16 94%	0/16 0%	27/27 100%
G2	14/59 24%	45/59 76%	0/59 0%	45/46 98%
G3	6/24 25%	18/24 75%	0/24 0%	72/72 100%
G4	22/66 33%	44/66 67%	0/66 0%	94/94 100%

Fig. 11. Distribution of subjects in gap ORs in change of agent per each age group



In clitic resumptive ORs, all the groups showed a strong preference for null subjects in change-of-action, and never used post-verbal subjects here (see table 15, fig. 12 and 13). In change-of-agent, null subjects were never used, as expected, but here preverbal subjects prevail over post-verbal ones, as in change-of-action. Interestingly, post-verbal subject were never produced by the 6-year-olds.

Table 15. Distribution of subjects in resumptive clitic ORs in both conditions, per each age group

	CHANGE-OF-ACTION			CHANGE-OF-AGENT		
	PREV	POST	NULL	PREV	POST	NULL
G1	5/14 36%	0/14 0%	9/14 64%	2/2 100%	0/2 0%	0/2 0%
G2	4/25 16%	0/25 0%	21/25 84%	7/12 58%	5/12 42%	0/12 0%
G3	4/13 31%	0/13 0%	9/13 69%	6/9 67%	3/9 33%	0/9 0%
G4	2/9 22%	0/9 0%	7/9 78%	2/3 67%	1/3 33%	0/3 0%

Fig. 12. Distribution of subjects in clitic resumptives, change-of-action

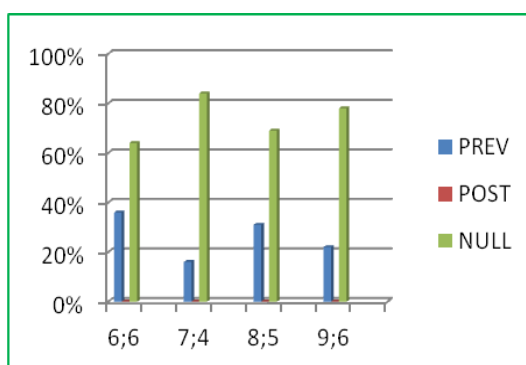
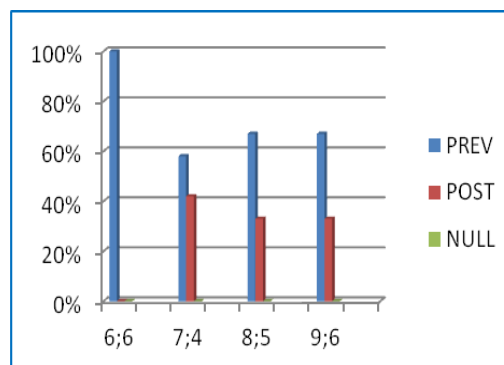


Fig. 13. Distribution of subjects in clitic resumptives, change-of-



Also in DP resumptive ORs, null subjects prevail and constantly increase with age in change-of action (100% in the older group, see table 16 and fig. 14). In this condition, post-verbal subjects were never used, as in clitic resumptives. The highest percentage of preverbal subjects in this condition was found in the youngest group (38%) and slightly decreases with age (17%-29%-0%).

In change-of-agent, very similar percentages of preverbal and post-verbal subjects were produced by all groups (see table 16) and none of them used null subjects.

Table 16. Distribution of subjects in DP resumptive ORs, in both conditions per each age group

	CHANGE-OF-ACTION			CHANGE-OF-AGENT		
	PREV	POST	NULL	PREV	POST	NULL
G1	3/8 37%	0/8 0%	5/8 63%	12/13 92%	1/13 8%	0/13 0%
G2	3/18 17%	0/18 0%	15/18 83%	10/11 91%	1/11 9%	0/11 0%
G3	2/7 29%	0/7 0%	5/7 71%	3/3 100%	0/0 0%	0/0 0%
G4	0/0 0%	0/0 0%	6/6 100%	4/4 100%	0/0 0%	0/0 0%

Fig. 14. Distribution of subjects in DP resumptives, change-of-action

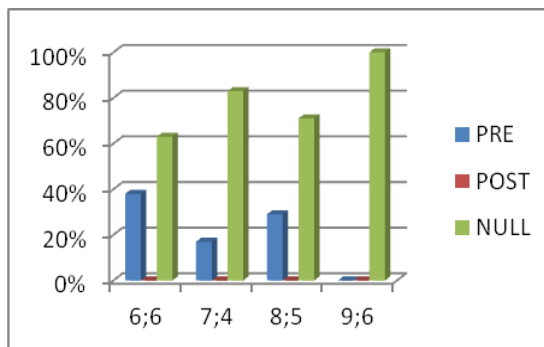
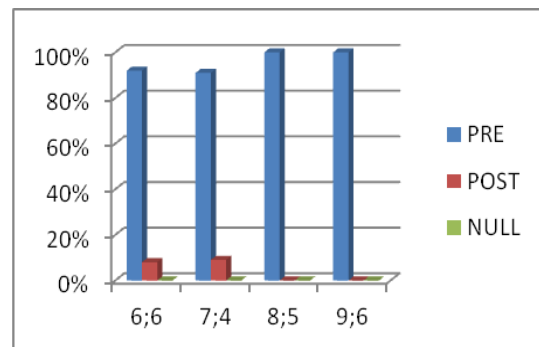


Fig. 15. Distribution of subjects in DP resumptives, change-of-agent

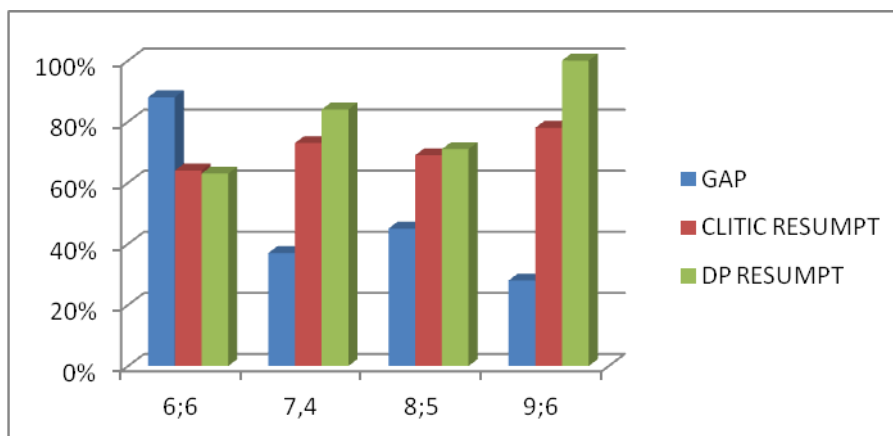


Focusing on null subjects across different types of object relative clauses in change of action condition only, where they are pragmatically right, interesting observations can be made: in gap object relatives, the amount of null subjects decreases with age, especially between 6 and 7 years. On the other hand, in clitic resumptive object relatives, the amount of null subjects does not vary with age, with a mean percentage of 70%. Also DP resumptive ORs show an opposite pattern compared to gap ORs: null subjects constantly increase with age, ranging from 63% to 100% (see table 17 and fig. 17).

Table 17. Null subjects in gap, clitic resumptive and DP resumptive ORs in change of action condition

AGE GROUPS	GAP	CLITIC RESUMPT	DP RESUMPT
G1	88%	64%	63%
G2	37%	73%	84%
G3	45%	69%	71%
G4	28%	78%	100%

Fig. 17. Null subjects across different types of object relative clauses, in change of action condition only



If we correlate the use of null subjects and the demonstrative *quello* as relative head in gap ORs in change-of-action only, we observe that an opposite pattern emerges in the younger and the older groups (see table 18 and fig. 18): indeed, the 6-year-olds preferred the use of light headed object relative clauses with null subject (47), whereas the 9/10 year-olds used much more headed object relative clauses with expressed subject, as in (48).

(47) *Quella che stanno salutando.* (6;03)

The one that (they) are greeting.

TARGET: *Mi piace la maestra che (i vigili) salutano/fermano.*

I like the teacher that (the policemen) are greeting/halting.

(48) “*Mi piace la maestra che i vigili fermano*”. (9;08)

I like the teacher that the policemen are halting.

TARGET: *Mi piace la maestra che (i vigili) salutano/fermano.*

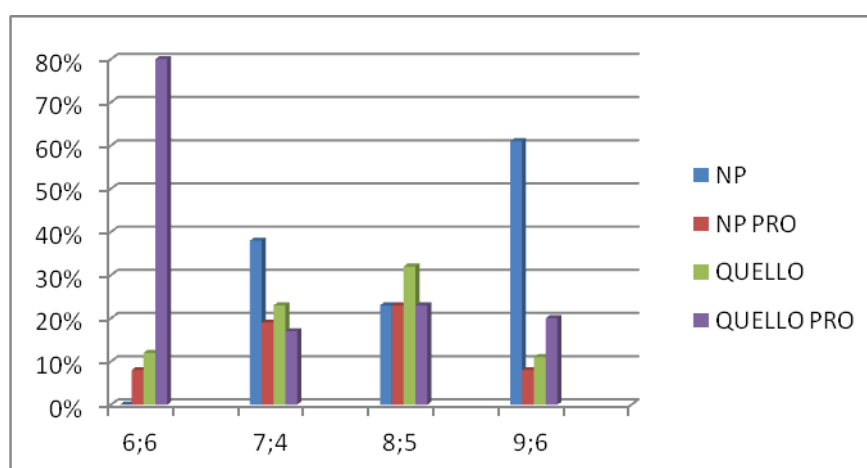
I like the teacher that (the policemen) are greeting/halting.

On the other hand, there seems to be no difference between the 4 types of ORs in the 7 and 8-year-olds, who used very similar percentages of gap headed/light headed ORs with either null or expressed subject (see table 18 and fig. 18).

Table 18. Correlation between the use of light heads and null subjects with percentages, in gap ORs only in change-of-action

	NP	NP PRO	QUELLO	QUELLO PRO
G1	0/25 0%	2/25 8%	3/25 12%	20/25 80%
G2	18/47 38%	9/47 19%	11/47 23%	8/47 17%
G3	5/22 23%	5/22 23%	7/22 32%	5/22 23%
G4	45/74 61%	6/74 8%	8/74 11%	15/74 20%

Fig. 18. Correlation between the use of light heads and null subjects in gap ORs, only in change-of-action



Differently from gap ORs, in clitic resumptives all groups of children showed a strong preference for light headed ORs with null subject, as in (49):

(49) “Quello che i bambini lo accarezzano”. (7;03)

The one that the children him-CLIT are caressing.

TARGET: (Mi piace) il gatto che i bambini accarezzano/mandano via.

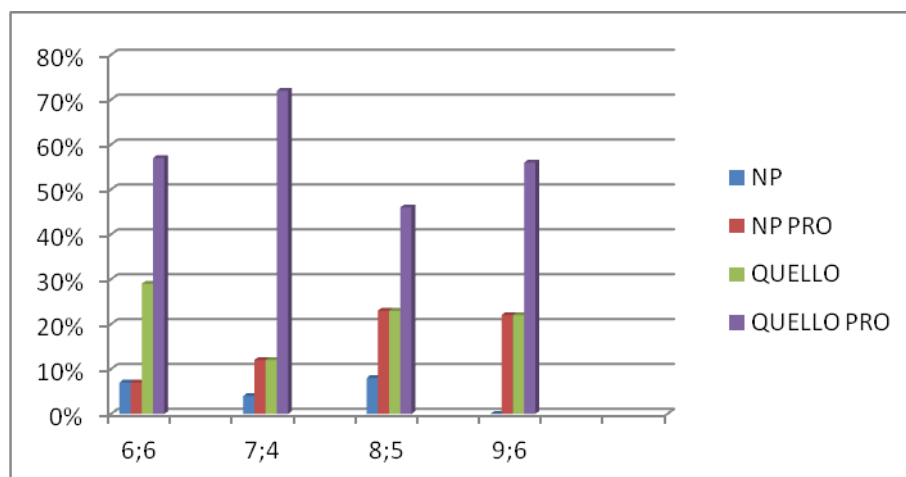
(I like) the cat that the children are caressing/chasing away.

This kind of resumptive OR was produced at very high percentages, around 50% for 6, 8 and 9/10-year-olds, and around 70% for 7-year-olds (see table 19 and fig.19).

Table 19. Percentages of headed/light headed resumptive ORs in each age group, with either null or expressed subject.

	NP	NP PRO	QUELLO	QUELLO PRO
G1	1/14 7%	1/14 7%	4/14 29%	8/14 57%
G2	1/25 4%	3/25 12%	3/25 12%	18/25 72%
G3	1/13 8%	3/13 23%	3/13 23%	6/13 46%
G4	0/9 0%	2/9 22%	2/9 22%	5/9 56%

Fig. 19. Headed/light headed resumptive ORs with either null or expressed subject, per each age group



In DP resumptive ORs, all groups of children never produced headed object relative clauses: indeed, they always chose *quello/quella* as relative head. Moreover, they showed a strong preference for light headed ORs with null subjects (53), as in

clitic resumptive ORs (see table 20 and fig. 20). Here, the 9/10-year-olds always produced light headed DP resumptives with null subject as in (50).

(50) “Quello che sollevano l’elefante”. (9;05)

The one that (they) are lifting up the elephant.

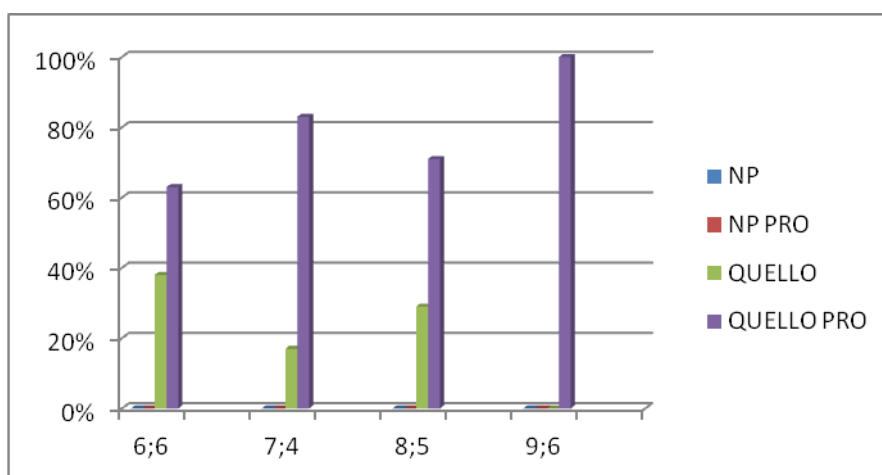
TARGET: (Mi piace) l’elefante che (i nonni) sollevano.

(I like) the elephant that (the grandparents) are lifting up.

Table 20. Percentages of headed/light headed DP resumptives with either null or expressed subject, per each age group

	NP	NP PRO	QUELLO	QUELLO PRO
G1	0 0%	0 0%	3/8 38%	5/8 63%
G2	0 0%	0 0%	3/18 17%	15/18 83%
G3	0 0%	0 0%	2/7 29%	5/7 71%
G4	0 0%	0 0%	0 0%	6/6 100%

Fig. 20. Headed/light headed DP resumptives with either null or expressed subject, per each age group



IV.I.VI Production of different types of passive object relatives (PORs) in typical development and controls

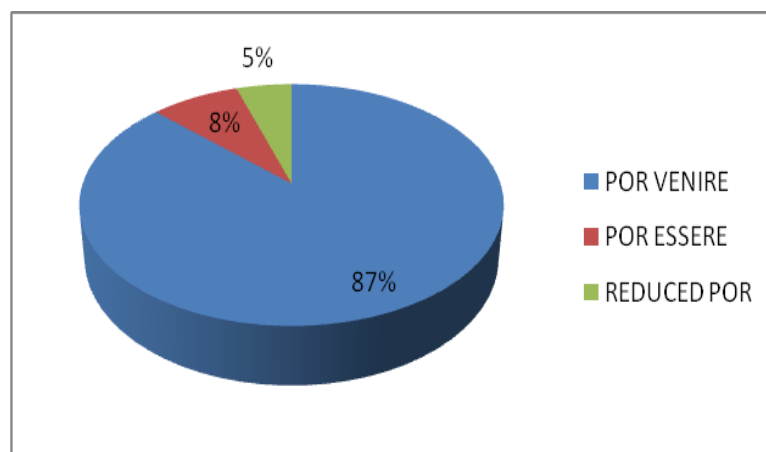
Passive object relatives (PORs, Belletti, 2009) are widely attested in Italian-speaking children and adults' production (Guasti and Cardinaletti, 2003; Utzeri, 2006, 2007; Belletti and Contemori, 2010; Volpato, 2010; Contemori, 2011, a. o.), being the preferred answer typology when object relative clauses are targeted.

In our experiment, TD children produced 408/1392 PORs, corresponding to 29% of the total amount of items (see table 21 and fig. 21). All the age groups preferred the auxiliary *venire* to form passive object relatives (51): indeed, 355/408 PORs (87%) were produced with this auxiliary, whereas 31/408 contained the auxiliary *essere* (8%, see example 52), and 22/408 were reduced PORs (5%, see example 53). Children also uttered 45 passive causative constructions with *si fa* + verb (54) and only 2 passive causative constructions with the reflexive verb *lasciarsi* (55). Interestingly, all the groups of TD children almost never omitted the by-phrase in change-of-agent, differently from change-of-action (see table 22).

Table 21. Percentages of different types of PORs per each age group

	POR VENIRE	POR ESSERE	REDUCED POR	TOT
G1	40/228 18%	0/228 0%	2/228 0,80%	42/228 18%
G2	61/396 15%	13/396 3%	2/396 0,50%	76/396 19%
G3	105/324 32%	15/324 5%	12/324 4%	132/324 41%
G4	149/444 34%	3/444 0,70%	6/444 1,4	158/444 36%
TOT (out of the PORs produced)	355/408 87%	31/408 8%	22/408 5%	408/1392 29%

Fig. 21. Different types of PORs in TD children with percentages



(51) “Quello che **viene sollevato** dai papà”. (7;07)

The one that is being lifted up by the fathers.

TARGET: (Mi piace) l’elefante che sollevano le mamme/i papà.

(I like) the elephant that are lifting up the mothers/the fathers.

(52) “Mi piace la scimmia che è **stata guardata** dai bambini”. (8;10)

I like the monkey that has been looked at by the children.

TARGET: (Mi piace) la scimmia che guardano i gatti/i bambini.

(53) “Mi piace il cane **pettinato** dai bambini”. (8;08)

I like the dog combed by the children.

TARGET: (Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) the dog that are combing the children/the hairdressers.

(54) “Il gatto che **si fa accarezzare** dai bambini”. (6;04)

The cat that has itself caressed by the children.

TARGET: (Mi piace) il gatto che (i bambini) accarezzano/mandano via.

(I like) the cat that (the children) are caressing/chasing away.

(55) “Mi piace di più il cane che **si lascia pettinare** dai parrucchieri”. (9;00)

I like best the dog that gets itself combed by the hairdressers.

TARGET: (Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) the dog that are combing the children/the hairdressers.

Table 22. By-phrases in PORs in both conditions per each age group

	BY-PHRASES CHANGE OF ACTION	BY-PHRASES CHANGE OF AGENT
G1	11/21 52%	27/27 100%
G2	21/41 51%	45/46 98%
G3	49/72 68%	72/72 100%
G4	66/82 80%	94/94 100%
TOT	147/216 68%	238/239 100%

A quantitative analysis of group performances (table 21) showed that the amount of PORs produced instead of gap object relatives increases with age. Indeed, G3 produced significantly more PORs than G1 ($z = 2.626$, $p < 0.01$) and G2 ($z = 2.671$, $p < 0.01$), and G4 was significantly more accurate than G1 ($z = 2.213$, $p < 0.05$). Also the use of the by-phrase in change-of-action is higher in older children (from 52% to 80%), becoming similar to adults' performance (91%).

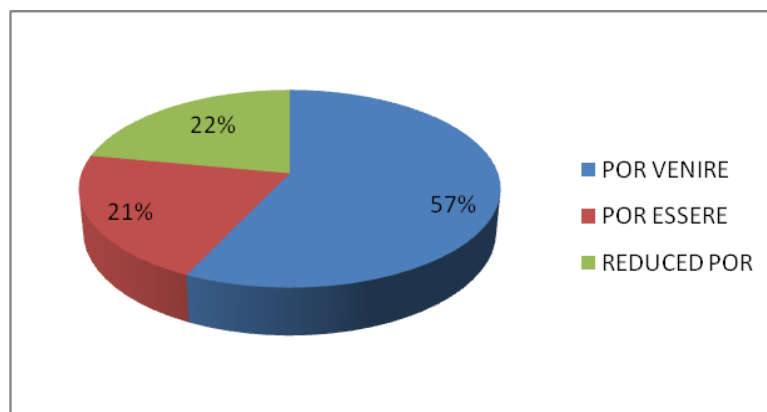
Another interesting finding was that children using the causative construction “*si fa + verb*” tended to avoid the passive construction in the task on passive. In all, 38/45 passive causative constructions with *farsi + verb* (84%) were produced by children not using passive sentences in the task on passive (included in the set of tasks of elicited production administered to children). Therefore, a correlation seems to exist between the use of *farsi*, which is the type of passive construction easier to comprehend and produce for younger children (Contemori and Belletti, 2013) and the avoidance of passive sentences in the task on passive.

As regards the group of adults, they used a much higher amount of PORs (94% of times, 113/120) compared to children, confirming previous studies on the topic (Belletti and Contemori, 2010; Contemori, 2011; Contemori and Belletti, 2013). A statistical analysis revealed that adults produced significantly more PORs than all groups of TD children ($G5 > G1$, $z = 5.219$, $p < 0.001$; $G5 > G2$, $z = 5.539$, $p < 0.001$; $G5 > G3$, $z = 3.962$, $p < 0.001$; $G5 > G4$, $z = 4.113$, $p < 0.001$).

Adults showed a slight preference for the auxiliary *venire* (57% over the total amount of PORs, see fig. 22), as well as younger participants. However, they used PORs with the auxiliary *essere* and reduced ones at higher percentages compared to

children (21% and 22%, respectively), and they did not produce any causative constructions with *farsi* or *lasciarsi*, as expected.

Fig. 22. Percentages of different types of PORs in adults



As well as TD children, adults never omitted the by-phrase in change-of-agent; however, differently from younger participants, they produced a higher amount of by-phrases in change-of-action (91% vs. 68% in TD children, see table 23).

Table 23. Different types of PORs in adults' production over the total amount of items, divided per condition

	CHANGE OF ACTION				CHANGE OF AGENT			
	VENIRE	ESSERE	REDUCED	BY-PHRASE	VENIRE	ESSERE	REDUCED	BY-PHRASE
ADULTS	33/60 55%	12/60 20%	11/60 18%	51/56 91%	31/60 52%	12/60 20%	14/60 23%	57/57 100%

IV.I.VII Elicited production of object relative clauses in atypical development

As well as TD children, also language impaired participants produced much more SRs than ORs. Indeed, a statistical analysis revealed that diagnosed dyslexics were significantly more accurate in SRs than ORs production ($z = 7.084$, $p < 0.001$), as well as suspected dyslexics ($z = 7.142$, $p < 0.001$).

However, comparing typical and atypical development, some differences emerge in the production of ORs (see table 24): children with diagnosed or suspected dyslexia produced a much lower percentage of gap ORs (4% in dyslexics and 5% in suspected dyslexics vs. a mean of 24% in TD) and a much higher percentage of ORs

with NP resumption (21% in dyslexics, 17% in suspected dyslexics vs. a mean of 5% in TD) as in (56). Interestingly, the percentages of gap ORs and ORs with DP resumption seem to be reversed in TD/non TD children.

Moreover, non TD children produced a bigger amount of head inversions (23% in dyslexics, 35% in suspected dyslexics) as in (57).

(56) “Mi piace di più quello che i topi toccano il cavallo” (dyslexic child, 11;03)

I like best the one that the mice are touching the horse.

TARGET: (Mi piace) il cavallo che toccano i topi/le scimmie.

(I like) the horse that are touching the mice/the monkeys.

(57) “A me piace gli orsi che accarezzano un bambino” (dyslexic child, 8;05)

I like the bears that are caressing one child.

TARGET: (Mi piace) il bambino che gli orsi accarezzano.

(I like) the child that the bears are caressing.

table 24: results in TD/non TD children and controls when an OR was elicited

	DYSLEXICS	SUSPECTED DYSLEXICS	TD 6;6	7;4	8;5	9;6	ADULTS
PASSIVE ORs (POR)	31%	8%	18%	19%	41%	36%	94%
OBJECT RELATIVES	4%	5%	18%	27%	14%	32%	2%
NP RESUMPTION	21%	17%	9%	8%	3%	2%	0%
CLITIC RESUMPT	4%	5%	7%	10%	7%	3%	0%
HEAD INVERSION	23%	35%	26%	22%	18%	14%	2%
SVO	4%	15%	6%	0,2%	1,2%	0,2%	0%
OR > SR	4%	1%	0,4%	1,8%	1,2%	2%	2%
UNGRAMMATICAL	4%	4%	3%	1,5%	1,5%	0,2%	0%

Children with suspected dyslexia produced much fewer passive object relatives than TD children (8% vs. 29%) and dyslexics (31%). On the other hand, they showed to prefer head inversion and SVO sentences, which are computationally less demanding structures compared to ORs and PORs. Particularly, they scored a very high percentage in SVO (15% vs. 4% in dyslexics and 1,4% in TD).

Finally, both children with dyslexia and suspected dyslexia produced more ungrammatical sentences (4%) than TD (1,3%), a percentage similar to the one in 6-year-olds (3%), but not in older TD children (1,5% - 0,2%).

IV.I.VIII The status of the head and the use of null subjects in gap and resumptive ORs in atypical development

Also in atypical development the use of light headed object relatives seems to be correlated to the production of clitic or DP resumption (see table 25): indeed, dyslexic children produced 3/3 clitic resumptives and 15/15 DP resumptives with *quello* as relative head. Moreover, null subjects were used in all the resumptive object relatives produced in change-of-action (where null subjects are pragmatically correct). Therefore, like TD children, dyslexic participants showed to prefer light headed resumptives with null subject, as in (58). The dyslexic child aged 11;03 also produced 3/3 ORs with DP resumption (2 in change-of-action and one in change-of-agent) with *quello* as relative head and a null subject, as in (59).

(58) “A me piace quello che lo lavano”. (8;05)

I like the one that (they) it-CLIT_{masc sing} are washing.

TARGET: (Mi piace) il cane che (i papà) lavano/sporcano.

(I like) the dog that (the fathers) are washing/soiling.

(59) “Mi piace quella che salutano la maestra”. (11;03)

I like the one that (they) are greeting the teacher.

TARGET: (Mi piace) la maestra che (i vigili) salutano.

(I like) the teacher that (the policemen) are greeting.

Conversely, dyslexics produced 3/3 headed gap ORs in change-of-agent with post-verbal subject (60), as expected, showing to prefer the choice of an NP as relative head when they utter a gap object relative.

(60) “Mi piace la bambina che baciano i cani”. (8;07)

I like the girl that are kissing the dogs.

TARGET: (Mi piace) la bambina che baciano i cani/i nonni.

(I like) the girl that are kissing the dogs/the grandparents.

As regards suspected dyslexics, they produced 2/3 headed gap ORs and 1/3 light headed gap OR with a null subject in change-of-action. In change-of-agent, they uttered only one light headed gap OR.

In clitic and DP resumptive ORs, they only produced light headed ORs, like TD and dyslexic children. However, the use of the demonstrative *quello* seems not to be correlated exclusively with null subjects: indeed, in change-of-action, they totally produced 4 clitic resumptives, among which only one contained a null subject. In DP resumptives, they uttered 5/6 light headed ORs with null subjects and 1/6 with a post-verbal subject (see table 25).

Table 25. Headed/light headed gap and resumptive ORs with either null or expressed subject in atypical development, in change-of-action only.

	DYSLEXIC CHILDREN				SUSPECTED DYSLEXIC CHILDREN			
	NP	NP PRO	QUELLO	QUELLO PRO	NP	NP PRO	QUELLO	QUELLO PRO
GAP OR	0	0	0	0	1/3	1/3	0/3	1/3
CLIT OR	0/3	0/3	0/3	3/3	0/4	0/4	3/4	1/4
DP OR	0/10	0/10	0/10	10/10	0/6	0/6	1/6	5/6

IV.I.IX The distribution of subjects in gap and resumptive ORs in atypical development

Despite the few object relatives produced, dyslexic children showed to have a good mastery of the syntactic and pragmatic knowledge required to place the subject in gap and resumptive ORs in the most suitable position, like TD children. Indeed, they totally produced 3 gap ORs, only in change-of-agent, and all of them presented a post-verbal subject, as expected. As regards clitic resumptive ORs, they produced 3/3 sentences with a null subject in change-of-action, which is again the expected type of response in this condition. In DP resumptives, they totally uttered 10/10 ORs in change-of-action using a null subject, whereas the 5 DP resumptives produced in change-of-agent presented a preverbal subject, similarly to TD children.

Also the suspected dyslexics had a good performance in the distribution of subjects in gap ORs, since in change-of-action, they produced 2/3 gap ORs with a

null subject and 1/3 with a preverbal one. Conversely, in change-of-agent, they produced one gap OR with post-verbal subject.

On the other hand, in clitic and DP resumptive ORs, they showed a somehow different performance compared to TD and dyslexic children. In clitic resumptive ORs, they produced 1/4 OR with a null subject in change-of-action, as expected, and 1/4 OR with a marginalized post-verbal subject (61) in the same condition, which is again pragmatically correct.

(61) “Quello che lo accarezzano... gli orsi. (7;01)

The one that it-CLIT_{masc sing} are caressing... the bears.

However, they also produced 2/4 clitic resumptive ORs with a wrong clitic pronoun (62-63), using a preverbal subject in (62) and a pragmatically wrong post-verbal subject in (63).

(62) “**Quello** che gli orsi **li** accarezzano. (6;06)

The one that the bears are them-CLIT caressing.

(63) “**Quel bambino** che **gli** accarezzano gli orsi mi piace”. (6;11)

That child that him-CLIT_{masc sing dative} are caressing the bears I like.

In DP resumptives, they uttered 5/6 ORs with null subject in change-of-action, as expected, and 6/7 ORs with preverbal subject in change-of-agent, similarly to TD and dyslexic children. However, one child produced a DP resumptive OR with a marginalized post-verbal subject in change-of-agent (64), which is pragmatically wrong in this condition, and one DP resumptive OR with a not marginalized post-verbal subject preceding the object in change-of-action (65). Neither TD nor dyslexic children ever produced a sentence like the one in (65).

(64) “Quello che pettinano il cane, i bambini”. (7;01)

The one that are combing the dog, the children.

TARGET: (Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) The dog that are combing the children/the hairdressers.

(65) “Quello che accarezzano i bambini il gatto”. (7;01)

The one that are caressing the children the cat.

TARGET: (Mi piace) il gatto che (i bambini) accarezzano/mandano via.

(I like) the cat that (the children) are caressing/chasing away.

IV.I.X Production of different types of PORs in atypical development

Dyslexic children produced a total amount of 22 passive object relatives (31%), 11 in change-of-action and 11 in change-of-agent, showing a strong preference for the auxiliary *venire* (21/22 PORs with *venire* and 1/22 reduced POR). They used the by-phrase 55% of times in change-of-action (6/11) and 100% in change-of-agent (11/11), similarly to TD children.

Interestingly, suspected dyslexic produced a much lower amount of PORs: only 8% (7 sentences), compared to 31% in dyslexics and 29% in TD children. Moreover, all of them were produced by one and the same child. This means that 6/7 suspected dyslexics never produced passive object relatives.

The suspected dyslexic child produced 4 PORs with *venire* in change-of-action, none of them with a by-phrase, and 3 PORs with *venire* in change-of-agent (2 of them with a by-phrase). Importantly, 3/7 PORs were ungrammatical (see example 66), due to the use of the auxiliary *venire* in the present perfect tense, which is impossible in Italian. Besides, one of these ungrammatical PORs also contained an incorrect preposition: the child used *con* (with) instead of *da* (by) to form the by-phrase (67).

(66) “Quello che viene stato pettinato”. (6;06)

The one that comes being combed.

TARGET: (Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) the dog that are combing the children/the hairdressers.

(67) “Quella che viene stata guardata con i gatti”. (6;06)

The one that comes being looked with the cats.

TARGET: (Mi piace) la scimmia che guardano i gatti/i bambini.

(I like) the monkey that are looking at the cats/the children.

IV.II The repetition task

IV.II.I Results of the typically developing children and controls

In the repetition task, all groups of TD children performed above chance both in agent and action condition, with an increase in the total amount of correctly repeated ORs according to age (from 73% to 90%, see table 1, fig. 1 and 2). G1 was significantly less accurate than all groups of older children (G2 $z = 2.153$, $p < 0.05$; G3 $z = 3.44$, $p < 0.001$; G4 $z = 2.911$, $p < 0.01$).

The control group of adults performed almost at ceiling (98%), and was significantly more accurate than G1 ($z = 3.076$, $p < 0.01$) and G2 ($z = 2.130$, $p < 0.05$).

table 1. TD children and controls: results in ORs imitation in change of action/agent condition and mean scores

Age groups	ORs change of action	ORs change of agent	Mean scores
G1	68%	77%	73%
G2	84%	87%	86%
G3	95%	91%	93%
G4	90%	89%	90%
G5	100%	97%	98%

Fig. 1. ORs imitation in TD children and controls

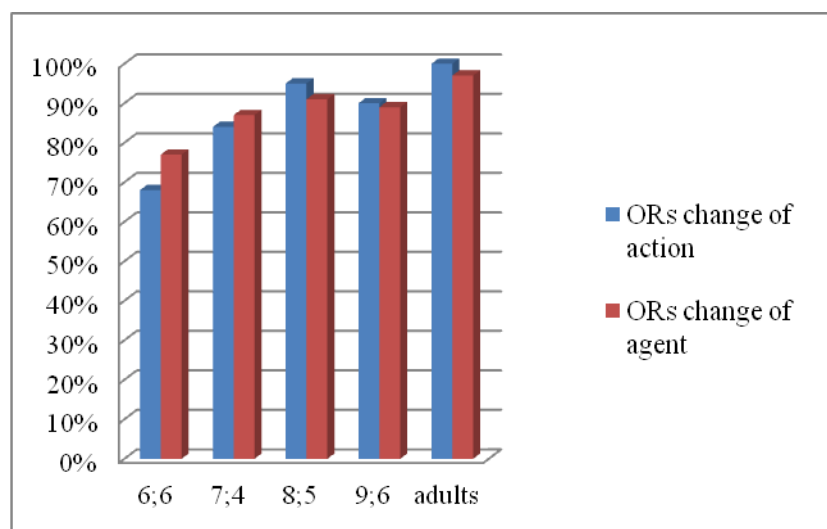
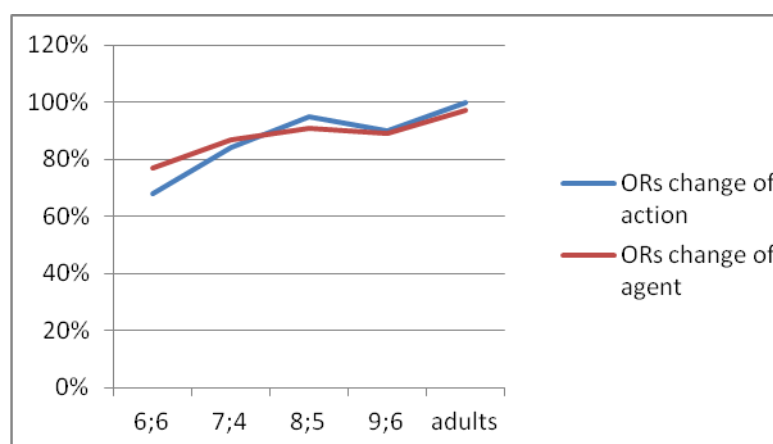


Fig. 2. Increase of correctly repeated ORs with age in both conditions



In all, 44 children made at least one mistake in the imitation task in the change of agent condition for a total amount of 89 errors. The most common error type was the transformation of the targeted OR into a SR through the inversion of the theta-roles, as in (1) (see table 2 for all the typologies of error in this condition):

(1) “Mi piace la bambina che bacia i cani”. (6;08)

I like the girl that is kissing the dogs.

TARGET: Mi piace la bambina che baciano i cani.

I like the girl that are kissing the dogs.

34 children (60%) opted for this strategy, which is attested at a mean percentage of 66% over the total amount of errors in this condition. Indeed, this was the most expected error type, since the child only needed to omit the plural verbal suffix *-no*, which determines the agreement between the plural embedded subject and the verb, in order to turn the OR into a SR.

Other typologies of error were: ungrammatical sentences (2), transformation of the target OR into a SR through head inversion (3), ORs with a preverbal subject instead of a post-verbal one (4), probably due to an interference with ORs with preverbal subject in change of action condition, whose imitation was elicited in the same experimental session.

(2) “Mi piace i cani che pettina i barbieri”. (7;03)

I like the dogs that is combing the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

(3) “I cani che leccano la bambina”. (9;08)

The dogs that are licking the girl.

TARGET: Mi piace la bambina che baciano i cani.

I like the girl that are kissing the dogs.

(4) “Mi piace la scimmia che i gatti guardano”. (7;01)

I like the monkey that the cats are looking at.

TARGET: Mi piace la scimmia che guardano i gatti.

I like the monkey that are looking at the cats.

There was one child producing an OR with an opposite mismatch condition: a plural head instead of a singular one, and a singular embedded subject instead of a plural one (5).

(5) “Mi piacciono i cani che pettina il barbiere”. (7;03)

I like the dogs that is combing the hairdresser.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

Finally, two children produced 4 PORs with the auxiliary *venire* + by-phrase (6) and one child produced a reduced POR + by-phrase (7). Interestingly, 4/5 PORs were produced in the 8-year-olds and 1/5 in the 9/10-year-olds. Younger children did not produce any PORs instead of a target OR.

(6) “Mi piace l’elefante che viene sollevato dalle mamme”. (10;00)

I like the elephant that is being lifted up by the mothers.

TARGET: Mi piace l’elefante che sollevano le mamme.

I like the elephant that are lifting up the mothers.

(7) “Mi piace il cane pettinato dai barbieri”. (8;08)

I like the dog combed by the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

table 2. Error typologies with percentages in the change of agent condition in TD children

Error typologies	Percentage
Theta-roles inversion	59/89 66%
ungrammatical	14/89 16%
POR + by-phrase	4/89 6%
head inversion	4/89 4%
preverbal subject	3/89 3%
opposite mismatch	1/89 1%
other	3/89 3%

In the change of action condition, 42 children incorrectly repeated at least one sentence, for a total amount of 96 errors. The most frequent error typologies were the transformation of the target OR into a SR through head inversion (8) and ungrammatical sentences (9) (see table 3 for all the error typologies with percentages).

(8) “Mi piacciono gli orsi che accarezzano il bambino”. (7;09)

I like the bears that are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(9) “Mi piace il bambino che stanno accarezzando l’orso”. (6;03)

I like the child that are caressing the bear.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

Other typologies of error were: OR with a plural head instead of a singular one (10), OR>SR through theta-roles inversion (11), by erasing the last suffix *-no* (*sollevano* - *solleva*) on the embedded verb, or by changing the relative head (12), ORs with a post-verbal subject instead of a preverbal one (13), ORs with clitic resumption (14), with DP resumption (15), or with a null subject (16), which is pragmatically correct in this condition. Finally, only one SVO sentence (17) and one passive object relative (with auxiliary *venire*), plus a by-phrase (18), were produced.

(10) “Mi piacciono gli elefanti che i nonni sollevano”. (6;08)

I like the elephants that the grandparents are lifting up.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

(11) “Mi piace l’elefante che i nonni solleva”. (7;08)

I like the elephant that the grandparents is lifting up.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

(12) “Mi piace il papà che i cani sporcano”. (6;04)

I like the father that the dogs are soiling.

TARGET: Mi piace il cane che i papà sporcano.

I like the dog that the fathers are soiling.

(13) “Mi piace la maestra che fermano i vigili”. (6;07)

I like the teacher that are halting the policemen.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

(14) “Mi piace il cane che i papà lo sporcano”.

I like the dog that the fathers it-CLIT_{masculine sing} are soiling.

TARGET: Mi piace il cane che i papà sporcano.

I like the dog that the fathers are soiling.

(15) “Mi piace il vigile che mordono il vigile”. (6;05)

I like the policeman that (they) are biting the policeman.

TARGET: Mi piace il vigile che i cani mordono.

I like the policeman that the dogs are biting.

(16) “Mi piace il gatto che mandano via”. (6;08)

I like the cat that (they) are chasing away.

TARGET: Mi piace il gatto che i bambini mandano via.

I like the cat that the children are chasing away.

(17) “Mi piacciono gli orsi accarezzano il bambino”. (6;08)

I like the bears are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(18) “Mi piace la maestra che viene fermata dai vigili”.

I like the teacher that is being halt by the policemen.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

Table 3. Error typologies with percentages in the change of action condition

Error typologies	Percentages
SR with head inversion	30/96 31%
ungrammatical	23/96 25%
post-verbal subject	12/96 13%
clitic resumption	11/96 11%
DP resumption	1/96 1%
OR>SR	6/96 6%
null subject	4/96 4%

sing>plural head	2/96 2%
theta-roles inversion	3/96 3%
POR + by-phrase	1/96 1%
SVO	1/96 1%
other	3/96 3%

Comparing change of agent with change of action condition, some interesting differences emerge: first of all, in change of action a wider range of error typologies are detected, while in the change of agent condition the theta-roles inversion is the predominant strategy to overcome the difficulty to imitate an object relative clause. This is probably related to the fact that in the change of agent condition, children only have to erase the final suffix *-no* on the embedded verb, while the linear order is maintained, to turn an OR with post-verbal subject in a SR (see example 19). Conversely, to manipulate an OR with preverbal subject as in (20a) in the same way, the child should produce a SR with a focalized preverbal object, which is a very marked syntactic order in Italian (20b). Indeed, this type of error was attested only at 6% in the change of action condition.

(19) a. *Mi piace l'elefante che sollevano le mamme.*

I like the elephant that are lifting up the mothers.

b. *Mi piace l'elefante che solleva le mamme.*

I like the elephant that is lifting up the mothers.

(20) a. *Mi piace l'elefante che i nonni sollevano.*

I like the elephant that the grandparents are lifting up.

b. *Mi piace l'elefante che i nonni solleva.*

I like the elephant that the grandparents is lifting up.

Moreover, a higher amount of ungrammatical sentences are produced in change of action (25% vs. 16%), and clitic and DP resumption are uttered only in this condition. Besides, clitic resumption is attested at a considerable percentage (11%).

Looking at the position of the embedded subject, children seem to be facilitated by a post-verbal rather than a preverbal subject, when they are administered a repetition task. This is demonstrated by two observations: first, there are more cases in which they locate a preverbal subject in a post-verbal position (13%, in change of action condition, see table 3), than cases where they decide to locate a post-verbal subject in a preverbal position (3%, in change of agent condition, see table 2); second, younger children, who had more difficulties in imitating object relatives, scored higher percentages of accuracy in change of agent condition, where ORs have a post-verbal subject (77% vs. 68% in 6-year-olds, 87% vs. 84% in 7 year-olds).

Interestingly, children showed to know pragmatical rules even when they do not correctly imitate the target: indeed, they omit the subject only in change of action condition (4% vs. 0% in change of agent), which is pragmatically correct, and conversely, they use more passive object relatives in change of agent condition (6% vs. 1%), maintaining the contrastive focus on the agent with a by-phrase (which was present in all the PORs produced).

As regards the group of adults, they scores almost at ceiling in both change of agent and change of action condition (100% and 97% respectively). The two adults who did not perform at ceiling in change-of-action made the same kind of error (21), indicating that it could be related to the item itself (maybe to the difficult perception and pronunciation of the Italian verb *pettinano*, where the final suffix *-no*, indicating the agreement of the verb with the plural subject, can be easily omitted for its similarity with the preceding syllable *-na*).

(21) “Mi piace il cane che pettina i barbieri”.

I like the dog that is combing the hairdressers.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

IV.II.II Results of the atypically developing children

Even if language impaired children performed above chance in both conditions, they reached much lower percentages of accuracy compared to TD children (68% in diagnosed dyslexics and 65% in suspected dyslexics, compared to a mean of 86% in TD children; see table 4, fig. 3 and 4). Indeed, diagnosed dyslexics were significantly less accurate than G2 ($z = -2.131$, $p < 0.05$), G3 ($z = -2.980$, $p < 0.01$) and G4 ($z = -2.717$, $p < 0.01$), whereas suspected dyslexics were significantly less accurate than G3 ($z = 2.204$, $p < 0.05$) and G4 ($z = -2.161$, $p < 0.05$).

table 4. Results in the imitation task in the groups of diagnosed dyslexics and suspected dyslexics

Language impaired groups	ORs change of action	ORs change of agent	Mean score
diagnosed dyslexics	64%	72%	68%
suspected dyslexics	62%	69%	65%
dyslexic child, 11;03	100%	100%	100%

Fig. 3. Level of accuracy in the imitation task: comparison between the two groups of atypically developing children

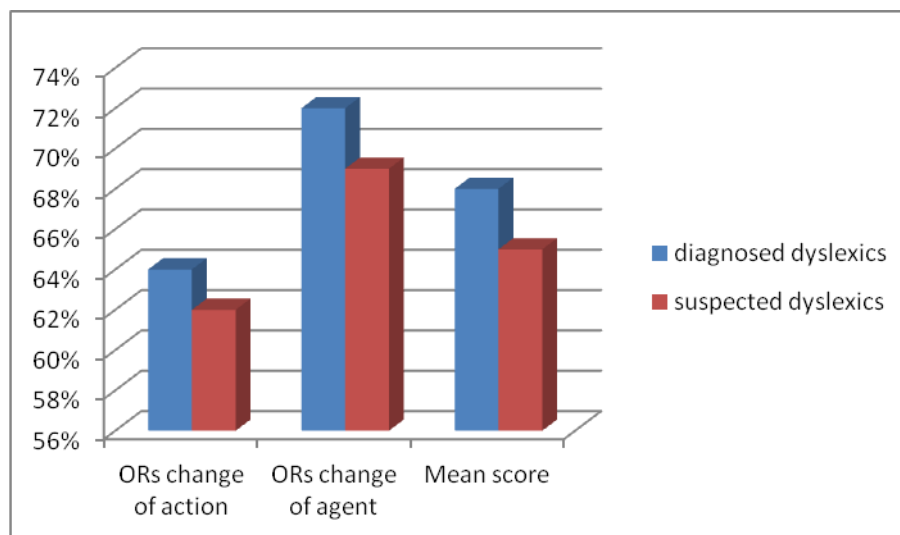
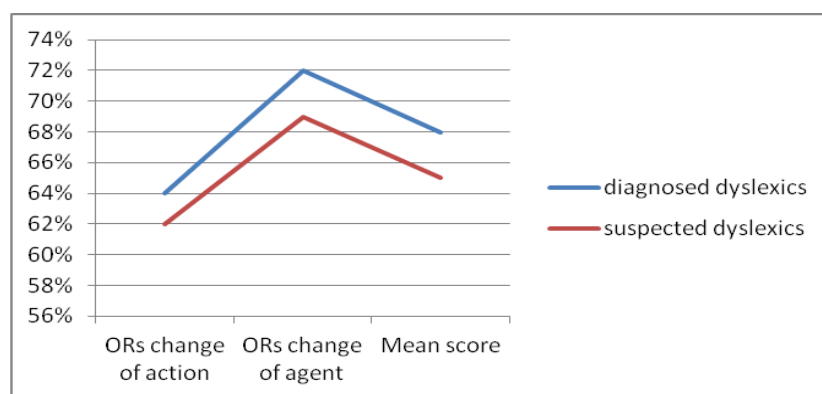


Fig. 4. Level of accuracy in the imitation task: comparison between the two groups of atypically developing children



Focusing on children with diagnosed dyslexia, 5/6 children made at least one error, while the older participant, aged 9;09, repeated all the items correctly. Interestingly, the other dyslexic participant who was not included in this group due to his age (he was 11;03), also scored a ceiling performance in the imitation task (100% of correct responses in both conditions).

The most common error typology in change of agent condition was the inversion of theta-roles, either with the change of the verbal plural stem in a singular one (22), or with other strategies (23a-b). This pattern was the same found in TD children, as described in the previous paragraph. In all, children with dyslexia produced 7/10 subject relative clauses with inversion of the theta-roles.

(22) “Mi piace l’elefante che solleva le mamme”. (8;05)

I like the elephant that is lifting up the mothers.

TARGET: Mi piace l’elefante che sollevano le mamme.

I like the elephant that are lifting up the mothers.

(23) a. “Mi piacciono i cavalli che guardano le scimmie”. (8;05)

I like the horses that are looking at the monkeys.

TARGET: Mi piace il cavallo che guardano le scimmie.

I like the horse that are looking at the monkeys.

b. “Mi piace i cani che pettinano il barbiere”. (8;05)

I like the dogs that are combing the hairdresser.

TARGET: Mi piace il cane che pettinano i barbieri.

I like the dog that are combing the hairdressers.

The other three errors were produced by the same child, aged 8;05, and all of them consisted in passive object relatives with the auxiliary *venire* plus a by-phrase (24).

(24) “Mi piace la scimmia che viene guardata dai gatti”. (8,05)

I like the monkey that is being looked at by the cats.

TARGET: Mi piace la scimmia che guardano i gatti.

I like the monkey that are looking at the cats.

In the change of action condition, dyslexic children made a wider variety of errors, as well as TD children. In all, they wrongly repeated 13 items: 1 SR with head inversion, 2 ungrammatical sentences (25), 2 ORs turned into SRs using a singular inflected verb and a focalized preverbal object (26), 3 ORs with post-verbal subject, 3 ORs with clitic resumption (27), and finally, one passive object relative with the auxiliary *venire* plus a by-phrase. Interestingly, the two ungrammatical sentences produced by dyslexic children consisted both in the wrong use of the definite article: a masculine, singular one (*il*) instead of a masculine plural one (*i*). This error was probably related to the fact that the Italian NP *papà* can receive both a singular and a plural interpretation. A correct use of the definite article is what determines the singular or plural agreement of this noun with the verb. The two children correctly inflected the embedded verb but chose the wrong definite article.

(25) “Mi piace il cane che **il** papà sporcano”. (8;05)

I like the dog that the masculine sing fathers are soiling.

TARGET: Mi piace il cane che **i** papà sporcano.

I like the dog that the fathers are soiling.

(26) “Mi piace la maestra che i vigili ferma”. (8;05)

I like the teacher that the policemen is halting.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

(27) “Mi piace il gatto che lo mandano via”. (8;05)

I like the cat that it-CLIT_{masculine sing} (they) are chasing away.

TARGET: Mi piace il gatto che i bambini mandano via.

I like the cat that the children are chasing away.

Also in this condition, we found a similar pattern to that observed in the groups of TD children: the presence of clitic resumptive ORs (however, dyslexic children did not adopt DP resumption), and the preference for post-verbal subjects (3 children produced an OR with a post-verbal instead of preverbal subject, whereas none of the dyslexics showed the opposite behavior).

As regards children with suspected dyslexia, 4/7 made at least one error in the repetition task. In all, they made 13 errors in the change of agent and 16 errors in the change of action condition.

In the change of agent condition, the most frequent error typology was again the inversion of the theta-roles (6 sentences) (28). Moreover, the suspected dyslexics produced one SVO sentence, one ungrammatical sentence (29), three head inversions, one OR with opposite mismatch (plural head, singular embedded subject) (30), and one OR with DP resumption (31).

(28) “Mi piacciono i cavalli che toccano le scimmie”. (6;08)

I like the horses that are touching the monkeys.

TARGET: Mi piace il cavallo che toccano le scimmie.

I like the horse that are touching the monkeys.

(29) “Mi piacciono la bambina che baciano i cani”. (9;07)

I like _{plural inflected verb} the girl _{sing subj} that are kissing the dogs.

TARGET: Mi piace la bambina che baciano i cani.

I like the girl that are kissing the dogs.

(30) “Mi piacciono i cavalli che tocca la scimmia”. (9;07)

I like the horses that is touching the monkey.

TARGET: Mi piace il cavallo che toccano le scimmie.

I like the horse that are touching the monkeys.

(31) “L’elefante che sollevano l’elefante”. (9;07)

The elephant that (they) are lifting up the elephant.

TARGET: Mi piace l’elefante che sollevano le mamme.

I like the elephant that are lifting up the mothers.

In the change of action condition, the most frequent error was turning the target OR into a SR through head inversion (9 sentences) (32); they also produced 3 ungrammatical sentences (33), 2 ORs with clitic resumption and one with DP resumption (34). Importantly, one of the ORs with clitic resumption contained a wrong clitic pronoun (the singular masculine *lo* instead of the singular feminine *la*) (35).

(32) “Mi piace i nonni che sollevano l’elefante”. (6;11)

I like the grandparents that are lifting up the elephant.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

(33) “Mi piacciono l’elefante che il nonno sollevano”. (9;07)

I like the elephant that the grandfather are lifting up.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

(34) “Mi piace **il bambino** che gli orsi accarezzano **il bambino**”. (6;11)

I like the child that the bears are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(35) “Mi piace **la maestra** che i vigili **lo** fermano”. (6;11)

I like the teacher that the policemen him-CLIT are halting.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

CHAPTER V

DISCUSSION

V.I Aims of our study and comparison with previous literature

With our experiment, we aimed at eliciting Italian subject and object restrictive relative clauses both in typical and atypical development. The participants were 116 TD children aged 6-10, 7 children with a diagnosis of developmental dyslexia (6 with a mean age of 8;06 and another child aged 11;03) and 7 children with suspected, undiagnosed dyslexia (mean age 7;9). We compared both typical and atypical development to a control group of 10 adults (mean age 23;8).

The aim of our task was twofold: first, we wanted to collect new linguistic data in SRs and ORs production in typical development according to age, dividing the 116 TD children in 4 age groups. Differently from previous studies on elicited production of Italian restrictive relative clauses (Guasti and Cardinaletti, 2003; Utzeri, 2006, 2007; Volpato, 2010; Belletti and Contemori, 2010; Contemori, 2011):

- we analyzed the status of the relative head (demonstrative *quello*/DP);
- we were also interested in verifying the possible consequences of two task modifications we applied to the Preference Task initially designed by Novogrodsky and Friedmann (2006) for Hebrew and adapted for several studies on Italian (Utzeri, 2006, 2007; Contemori, 2011; Volpato, 2010, a. o).

Moreover, we analyzed the nature (overt/null) and the distribution of subjects in gap ORs and in clitic/DP resumptive ORs, like Belletti and Contemori (2012). However, differently from Belletti and Contemori (2012), we separate the analysis of the distribution of subjects in gap ORs from that of resumptive ORs, since different patterns in the two types of relative clauses were expected.

Second, we compared the production of TD children to that of dyslexics and suspected dyslexics, in order to verify whether dyslexia determines a different pattern in the production of complex syntactic structures such as relative clauses, as it has been observed for children with Specific Language Impairment (see Novogrodsky and Friedmann, 2006 for Hebrew; Stavrakaki, 2002 for Greek; Contemori and Garraffa, 2013 for Italian) and hearing-impaired children (see

Friedmann et al., 2008; Friedmann and Sztermann, 2006 for Hebrew; Volpato, 2010 for Italian).

As explained in the introduction, the elicitation task on relative clauses was designed within a wider project held at the Department of Linguistics and Comparative Cultural Studies of the Ca' Foscari University of Venice. This project aimed at elaborating a set of tasks to elicit different syntactic structures (relative clauses, cleft sentences, direct wh-questions and passive sentences), to be used for evaluation of both typical and atypical development. Indeed, Italian clinical centres presently lack standardized production tests to evaluate linguistic skills of children with language impairment.

As regards the task on relative clauses, we included two task modifications in order to make the discourse context more felicitous:

- each character involved in the event was introduced before presenting the relevant picture, and
- we constantly changed the head of the RC, avoiding to have one and the same head for each item (the previous tasks always used *il bambino/la bambina* - the child - as the head of the target RC).

By doing so, we avoided to topicalize the head of the target RC, giving the same discourse saliency to each character. With these task modifications, we hoped to collect a higher number of ORs (since a topicalized head could bring the child to produce more SRs instead of target ORs), and a lower number of the demonstrative pronoun *quello* (“the one”) instead of a lexical NP as head of the RC, since the referent was different for each targeted sentence.

Results partly confirmed our expectations. Indeed, children participating at our experiment produced a higher amount of target gap ORs and a lower amount of resumptive ORs comparing to Utzeri (2006) and Contemori (2011), as shown in table 1 below. In Volpato (2010), normal hearing participants (mean age 6;8) produced a higher number of resumptives compared to our children (22,4% vs 11%), but they produced a similar percentage of gap ORs (14% vs 18%).

Table 1. Percentages of gap/resumptive ORs in our experiment and previous literature on Italian using the Preference Task

	Age of participants	Number/Percentage of gap ORs	Number/Percentages of resumptives
Utzeri, 2006	6-11	42/246 17%	57/246 23%
Volpato, 2010	6;8	22/156 14%	35/156 22,4%
Contemori, 2011	6;3	4/230 (2%) Match 17/138 (12%) Mismatch	55/230 (24%) Match 37/138 (27%) Mismatch
	7;5	9/120 (8%) Match 12/72 (17%) Mismatch	39/120 (33%) Match 37/72 (51%) Mismatch
	8;5	9/220 (4%) Match 28/132 (21%) Mismatch	35/220 (16%) Match 20/132 (15%) Mismatch
Our task	6;6	41/228 18%	37/228 16%
	7;4	106/396 27%	65/395 16,4%
	8;5	46/324 14%	32/324 10%
	9;6	140/444 32%	22/444 5%
	TOT	333/1392 24%	156/1392 11%

The different percentages of resumptive ORs collected in our experiment and in previous literature on Italian let us draw some conclusions on the importance not to use the one and the same head in each target relative (*il bambino/la bambina*). Indeed, the fact that Utzeri (2006), Volpato (2010) and Contemori (2011) always used “the child” as relative head probably made this NP a topic which was easily resumed by a clitic pronoun. For instance, Utzeri (2006) collected 40% of gap ORs and 60% of resumptive ORs out of the total amount of ORs produced, whereas in our experiment we found an opposite pattern: 68% of gap ORs and 32% of resumptive ORs. Moreover, we found similar percentages of the two different types of resumptives: 53% of clitic resumptive ORs and 47% of DP resumptive ORs, whereas Utzeri (2006) found a higher percentage of clitic resumption (78%). The higher percentages of resumptive ORs, first of all clitic resumptives, could have been an effect of the task itself. This demonstrates the importance of our task modification: namely, always changing the head of the RC in order not to topicalize the referent of the head and having it resumed with a clitic pronoun or a DP.

Moreover, we think that the much higher percentages of resumptive ORs collected by Contemori (2011) are due to the author’s decision to code sentences as in (1) and (2) as clitic and DP resumptive ORs, respectively (examples taken from Contemori, 2011). We disagree from this decision; since the relative head is omitted, it is not clear whether the sentences in (1) and (2) are resumptive relative clauses or

rather declarative sentences (“(I like) that the elephant is lifting her up”/ “(I like) that the elephant is lifting the child”).

(1) Che l’elefante la sta alzando.

That the elephant her-CLIT is lifting.

(2) Che l’elefante bagna il bambino

That the elephant is washing the child.

However, results disconfirmed our second expectation (that we would collect a higher amount of headed RCs). Indeed, children produced a very high amount of light headed relative clauses (RCs with the demonstrative pronoun *quello* as the relative head), especially the younger ones. It is not possible to compare our percentages on headed vs light headed ORs with previous literature, since ours is the first study on Italian analyzing the status of the head in object relatives clauses.

Another important characteristic of our task is that relative clauses were only elicited in a mismatch condition (singular head, plural embedded subject), differently from Utzeri (2006), Volpato (2010) and Contemori (2011), in order to prevent the child from producing ambiguous RCs with post-verbal subject like (4), taken from Utzeri, (2006), which has two possible interpretations, a SR interpretation as in (5) or a OR interpretation with post-verbal subject, as in (6).

(4) “Il bambino che pettina il re”.

The child that is combing the king.

(5) [DP Il bambino]_i [CP che [DP t_i] pettina il re]]

[DP The child]_i [CP that [DP t_i] is combing the king]]

(6) [DP Il bambino]_i [CP che pettina il re [DP t_i]]

[DP The child]_i [CP that is combing the king [DP t_i]]

Another difference from Utzeri (2006) is that we did not include adolescents in the control group of adults (the controls in her study start from 15-year-olds, whereas

our control participants are older than 19), since Volpato (2010) demonstrated that ORs are still problematic in adolescence.

V.II The subject/object asymmetry in ORs production

Results confirmed the well known subject/object asymmetry found in previous studies on Italian (Guasti and Cardinaletti, 2003; Utzeri, 2006, 2007; Volpato, 2010; Contemori, 2011), as shown in table 2. A problem encountered when comparing our data with Guasti & Cardinaletti (2003) and Utzeri (2006) is that in both studies they counted as SRs all subject relatives produced even when an OR was targeted. Consequently, in SRs production, percentages higher than 100% are collected. It should be better to count as SRs only the targeted ones, in order to evaluate the difference in SRs/ORs production and to compare the percentages with other studies.

Table 2. percentages of SRs and ORs (gap and resumptives) in our study and previous literature

	Age of participants	SRs	ORs (gap + resumptives)
Guasti & Cardinaletti, 2003	5;1-10	140%	65%
Utzeri, 2006	6-11	396/246 161%	40%
Volpato, 2010	6;8	99%	14%
Contemori, 2011	6;3	96%	26% Match 39% Mismatch
	7;5	85%	40% Match 68% Mismatch
	8;5	93%	20% Match 36% Mismatch
Our task	6;6	97%	34%
	7;4	98%	43%
	8;5	97%	24%
	9;6	98%	36,40%
	TOT	97%	35%

In our study, all groups of TD children and the control group of adults performed almost at ceiling in SRs production, whereas gap ORs were much more problematic. In all, children produced 1355/1392 SRs (97%) and 333/1392 gap object relatives (24%). Adults produced only 2 ORs (2%), showing a strong preference for passive

object relatives (94%), as found in previous studies (Utzeri, 2006; Belletti and Contemori, 2010; Contemori, 2011 a. o.). Conversely, they produced 118/120 SRs (98,4%). The small percentage of errors was due to the misunderstanding of the same picture by two adults, who interpreted the NP “the lion” in (7) as the patient and not the agent of the event. Consequently, they produced two passive object relatives.

(7) (Mi piace) il leone che tira/insegue i bambini.

(I like) the lion that is pulling/chasing the children.

The subject/object asymmetry is also confirmed by a statistical analysis using the Mann-Whitney test for independent samples, which revealed that SRs were significantly more accurate than ORs in each age group of TD children and adults (G1: $z = 9.513$, $p < 0.001$; G2: $z = 10.363$, $p < 0.001$; G3: $z = 10.878$, $p < 0.001$; G4: $z = 11.823$, $p < 0.001$; G5: $z = 2.064$, $p < 0.05$).

The groups of TD children did not differ in the production of SRs, always attested at 97%-98%, whereas the amount of gap ORs increases with age (from 18% to 32%), with the exception of 8-year-olds, who produced the fewest gap object relatives (14%). A statistical analysis revealed that G4 (m. a. 9;6) was significantly more accurate than G2 (m. a. 7;4) in target ORs ($z = 3.966$, $p < 0.001$). Obviously, the production of ORs in all groups of children, with the exception of G1, was significantly higher than that of adults, since they produced only 2 target ORs (G5<G2, $z = -2.674$, $p < 0.01$; G5<G3, $z = -2.048$, $p < 0.05$; G5<G4, $z = -2.143$, $p < 0.05$).

The SRs/ORs asymmetry could be explained in terms of avoidance of too demanding syntactic structures. Indeed, the production of ORs requires more computational resources than that of SRs, being the chain between the moved constituent and its trace (or silent copy) longer in object (9) than in subject relatives (8), as it has been already claimed for comprehension (see De Vincenzi’s 1991 Minimal Chain Principle).

(8) Il papà che _ bacia i gatti.

[_{DP} Il papà_i] [_{CP} che [_{IP} [_{DP} t_i] bacia i gatti]]]

The father that _ is kissing the cats.

[_{DP} The father_i] [_{CP} that [_{IP} [_{DP} t_i] is kissing the cats]]]

(9) L'elefante che i nonni guardano _

[_{DP} L'elefante;_i] [_{CP} che [_{IP} i nonni guardano [t_i]]]

The elephant that the grandparents are looking at _

[_{DP} The elephant_i] [_{CP} that [_{IP} the grandfathers are looking at [t_i]]]

Another approach recently proposed by Friedmann, Belletti, Rizzi (2009), the Relativized Minimality (RM), can certainly account for the asymmetry which is generally found between SRs and ORs in preschool children, but cannot explain the consistent amount of ORs normally collected in 6 to 7-year-olds (in Friedmann, Belletti and Rizzi, 2009, the participants were 3;7-5;00). In our experiment, children aged 6 and 7 produced 18% and 27% of ORs, respectively, even more than 8-year-olds (14%). Indeed, from the age of 8, children tend to use more passive object relatives, having fully acquired the use of passive at that age. The RM approach fails to explain why younger children manage to produce more ORs, even if their computational resources are less mature than in their older peers. Moreover, it seems to us that if such a grammatical approach was correct, young children would never be able to produce gap ORs, whereas many studies showed that despite the strong asymmetry found between SRs and ORs at any age, children do produce standard ORs at least from the age of 3 - 4 (Belletti and Contemori, 2010; Contemori and Garraffa, 2013; Friedmann, Belletti and Rizzi, 2009). In table 3 we present results of Italian-speaking TD children in Belletti and Contemori (2010) and Contemori and Garraffa (2013). In Belletti and Contemori (2010), the first line of each age group presents the percentages collected in the condition *plural head/subject singular*, while the second line presents the percentages obtained in the condition *singular head/subject singular or plural*.

Table 3. Percentages of elicited SRs/ORs in Belletti and Contemori (2010) and Contemori and Garraffa (2013).

	Age of participants	SRs	ORs
Belletti and Contemori, 2010	3 - 3;11	61%	39%
		79%	36%
	4 - 4;11	90%	52%
		94%	52%
	5 - 5;11	85%	49%
		91%	42%
Contemori and Garraffa, 2013	6 - 6;5	89%	53%
		96%	38%
	3;7 - 3;10	87%	16%
	4;5 - 5;5	83%	28%

V.III Answer typologies when ORs were targeted

The most preferred answer typologies in our TD children when they did not produce a target OR were: passive object relatives (29%), transformation of the OR into a SR (21%), and resumptive ORs (11%). Children sometimes used “wh-fillers” (*dove/quando/in cui*) instead of the complementizer *che* (4%) or produced ungrammatical sentences (1%).

As regards passive object relatives, TD children totally produced 408/1392 PORs, corresponding to 29% out of the total amount of items. All the age groups preferred the auxiliary *venire* to form passive object relatives (355/408 PORs, 87%), whereas 31/408 contained the auxiliary *essere* (8%), and 22/408 were reduced PORs (5%). Children also uttered 45 passive causative constructions with *si fa* + verb and only 2 passive causative constructions with the reflexive verb *lasciarsi*. Importantly, the amount of PORs produced instead of gap object relatives increases with age (from 18% to 41% in 8-year-olds, 36% in 9/10-year-olds): G3 produced significantly more PORs than G1 ($z = 2.626, p < 0.01$) and G2 ($z = 2.671, p < 0.01$), and G4 was significantly more accurate than G1 ($z = 2.213, p < 0.05$). Moreover, children using the passive causative construction “*si fa* + verb” tended to avoid the passive construction in the task on passive (which was included in the larger project on

elicited production of syntactic structures with marked word order mentioned above). In all, 38/45 causative constructions with *farsi* were produced by children not using passive sentences. A correlation seems to exist between the use of *farsi*, which is the passive construction easier to comprehend and produce for younger children (Contemori and Belletti, 2013) and the avoidance of passive sentences in the task on passive.

The group of adults used a much higher amount of PORs (94% of times, 113/120) compared to children, confirming previous studies on the topic (Belletti and Contemori, 2010; Contemori, 2011; Contemori and Belletti, 2013). A statistical analysis revealed that adults produced significantly more PORs than all groups of TD children (G5>G1, $z = 5.219$, $p < 0.001$; G5>G2, $z = 5.539$, $p < 0.001$; G5>G3, $z = 3.962$, $p < 0.001$; G5>G4, $z = 4.113$, $p < 0.001$). Adults showed a slight preference for the auxiliary *venire* (57% over the total amount of PORs), as well as younger participants. However, they used PORs with the auxiliary *essere* and reduced ones at higher percentages compared to children (21% and 22%, respectively), and they did not produce any passive causative constructions with *farsi* or *lasciarsi*, as expected.

V.IV Resumptive relative clauses in typical and atypical development

As regards the use of resumptive ORs (11%), these are widely attested in children's production across different languages, either using resumption as a correct strategy to form standard relative clauses, or considering it a colloquial form of spoken language (see Cinque, 2011). Different accounts have been proposed for this linguistic phenomenon: resumption has been defined a "saving device" used by children when movement is blocked or impaired (Shlonsky, 1992; Novogrosky and Friedmann, 2006; Friedmann et al., 2008). According to McKee and McDaniel (2001), resumptive pronouns are spell-out of traces that come into play when the trace is illicit for a principle of grammar, whereas resumptive DPs are treated as speech errors. Another theory was proposed by Belletti (2005), who accounted for resumption in children's relative clauses by suggesting that movement consists of two steps: copy + deletion. Within the raising analysis of relative clauses, deletion is *total* in gap RCs, *partial* in RCs with resumptive pronouns, and *absent* in RCs containing resumptive DPs.

However, we think that clitic and DP resumptives found in children's production are to be considered alternative strategies to form relative clauses (see Suárez, 1998), an UG parameter explored by children when they are acquiring syntax. Cinque's (2011) study on double headed relative clauses across different languages shows for instance that DP resumptives are attested as fully grammatical constructions in an adult language, Kombai, (Trans-New Guinea; Papua, Indonesia), as was initially reported by de Vries (1993). In (10.a) a resumptive OR with two copies of the same DP is presented, whereas in (10.b) the external noun is more general. In (10.c), a subject relative clause with the resumption of the DP is reported, again with a more general noun outside the relative clause (examples taken from de Vries, 1993, pp. 77-78, quoted in Cinque, 2011).

(10) a. [[**doü** adiyano-no] **doü**] deyalukhe.

[[**sago** give₃ PL.NONFUT-CONN] **sago**] finished_{ADJ}.

The sago that they gave is finished.

b. [[**gana** gu fali-kha] **ro**] na-gana-y-a.

[[**bush.knife** ^{2SG} carry-go_{2SGNONFUT}] **thing**] my-bush.knife-_{TR-PRED}

The bush knife that you took away, is my bush knife.

c. [[**yare** gamo khereja bogi-n-o] **rumu**] na-momof-a.

[[**old.man** join._{SS} work do_{DUR3SG.NF-TR-CONN}] **person**] my-uncle-_{PRED}

The old man who is joining the work is my uncle.

V.V Syntactic asymmetries between gap and resumptive object relative clauses

In our experiment, we found important asymmetries between gap and resumptive object relatives produced by children, regarding the status of the head and the distribution of overt/null subjects.

V.V.I Light head vs. DP head in gap and resumptive ORs

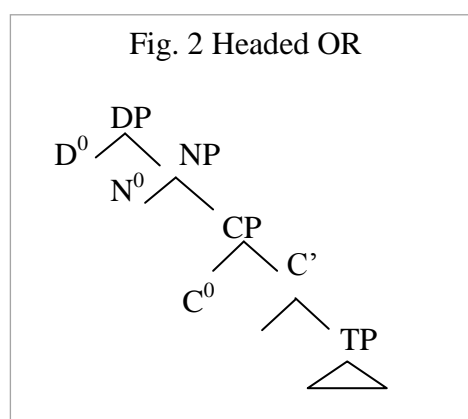
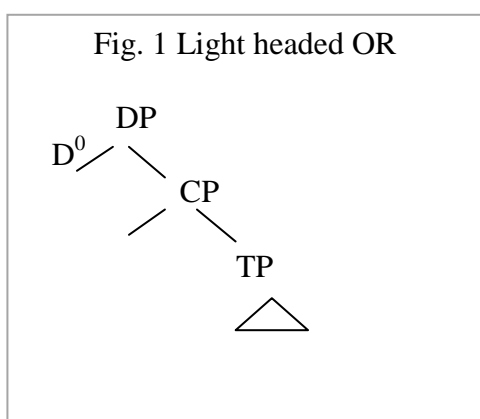
Younger TD children (mean age 6;6) show to prefer light headed subject relative clauses both in SRs (72%) and gap ORs (93%). The use of the demonstrative

pronoun *quello* decreases with age in SRs (from 72% to 30% at the age of 8), and ORs (from 93% to 29% in 9/10-year-olds), showing that older children prefer to produce headed relative clauses (see table 4).

Table 4. Percentages of headed/light headed gap ORs according to age

AGE GROUPS	HEADED GAP ORs	LIGHT HEADED GAP ORs
G1 (6;6)	7%	93%
G2 (7;4)	54%	46%
G3 (8;5)	48%	52%
G4 (9;6)	71%	29%

In a RM approach à la Friedmann, Belletti and Rizzi (2009), the preference for a light head could be attributed to the necessity to avoid a RM violation in ORs with a DP subject. However, since light-headed relative clauses are found in both SRs and ORs and they show a similar tendency in language development, a different approach must be looked for. The preference of younger children for light headed relative clauses can be accounted for with Citko's (2004) proposal that this type of relatives are less complex and computationally less demanding, since they involve a $[_{DP} D^0 CP]$ structure (see fig. 1), whereas headed relatives involve an extra nominal layer (see fig. 2).



This pattern was not confirmed in resumptive object relative clauses (see table 5), where the use of *quello* was not related to age: indeed, at all ages light headed relatives were attested at around 80% in ORs with clitic resumptives, whereas in ORs with DP resumptives two copies of the same DP were never found (in this case, all groups of children only produced light headed DP resumptives).

Table 5. Percentages of headed/light headed clitic resumptive ORs per each age group

AGE GROUPS	HEADED CLIT RESUMPT	LIGHT HEADED CLIT RESUMPT
G1 (6;6)	19%	81%
G2 (7;4)	16%	84%
G3 (8;5)	18%	82%
G4 (9;6)	15%	75%

Since resumptive ORs must be themselves seen as less complex and computationally less demanding structures than gap ORs, the correlation with a light head is not surprising.

V.V.II Null vs. DP subjects in gap and resumptive ORs

Moreover, we found that participants master the syntactic and pragmatic knowledge required to realize the subject and to place it in the most suitable position according to the discourse context.

In gap object relatives, children correctly preferred to use preverbal (35%) or phonologically null subjects (42%) in change-of-action, where the subjects are strongly topicalized, even if a certain amount of post-verbal subjects are produced (24%). Conversely, in change of agent, where the focus is on the agent rather than on the event, children preferred post-verbal subjects (74%) over preverbal ones (26%), whereas null subjects, which would have been pragmatically wrong in this condition, were never found. Similarly, the by-phrase in PORs was sometimes omitted only in the change of action condition (68% vs. 100%).

As in gap ORs, in clitic resumptive ORs elicited in change-of-action, null subjects (75%) exceed overt ones and preverbal subjects (25%) prevail over post-verbal subjects, which were totally absent in this condition. On the other hand, in change-of-agent, children never used null subjects, as expected, but preferred preverbal subjects (65%) instead of post-verbal ones (35%) also in this condition.

Also in DP resumptive ORs children never used a post-verbal subject in change-of-action, and showed a strong preference for null subjects (79%) in this condition. In change-of-agent, children preferred preverbal subjects (94%), as in change-of-action, and never produced null subjects, as expected. The few ORs with post-verbal subjects produced (6%) never presented a not marginalized post-verbal subject

immediately after the resumption of the DP. Indeed, a sentence like the one in (11), when the post-verbal subject is not marginalized, would result awkward:

(11) “Mi piace quello che sollevano l’elefante le mamme”.

I like the one that are lifting up the elephant the mothers.

TARGET: (Mi piace) l’elefante che sollevano le mamme/i papà.

(I like) the elephant that are lifting up the mothers/the fathers.

Table 6. Distribution of subjects in gap/resumptive ORs divided per condition

	CHANGE OF ACTION			CHANGE OF AGENT		
	NULL	PREVERBAL	POSTVERBAL	NULL	PREVERBAL	POSTVERBAL
GAP	42%	35%	24%	0%	26%	74%
CLITIC	75%	25%	0%	0%	65%	35%
DP	79%	21%	0%	0%	94%	6%

Looking at group performances, even more interesting patterns emerge. In change-of-action, where preverbal and null subjects are expected, the 6-year-olds showed to have a very good knowledge of the pragmatic and syntactic competence to place the subject in the required position, since they use 12% of times a preverbal and 88% of times a null subject, while they never used post-verbal subjects here. At the same time, they omitted the by-phrase in PORs only in change-of-action (52% vs. 100% in change-of-agent). Interestingly, the 6-year-olds performed better than all the groups of older children: the 7 and 8-year-olds produced in change-of-action the same amount of preverbal and post-verbal subjects (32% in G2, 27% in G3) and a slightly higher amount of null subjects (36% and 45% respectively). In the group of the 9/10-year-olds, preverbal (46%) and null subjects (28%) are predominant, but also post-verbal subjects are produced (26%), differently from the 6-year-olds. Interestingly, the by-phrase in PORs was omitted only in change-of-action in each age group.

In clitic resumptives, none of the groups ever used post-verbal subjects in change-of-action and null subjects in change-of-agent, as expected. Each age group showed a preference for null subjects in change-of-action and for preverbal subjects in change-of-agent. Interestingly, the six-year-olds always produced preverbal subjects in change-of-agent.

Also in DP resumptive ORs, null subjects prevail and constantly increase with age in change-of action (100% in the older group). In this condition, post-verbal subjects were never used, as in clitic resumptives. The highest percentage of preverbal subjects in this condition was found in the youngest group (38%) and slightly decreases with age (17%-29%-0%). In change-of-agent, none of the groups produced null subjects, as expected, and all of them produced very high percentages of preverbal subjects, almost at ceiling (90%-100%).

Table 7. Distribution of subjects in gap/resumptive ORs per each age group, divided per condition

	CHANGE OF ACTION			CHANGE OF AGENT		
	NULL	PREVERBAL	POSTVERBAL	NULL	PREVERBAL	POSTVERBAL
GAP						
6;6	88%	12%	0%	0%	6%	94%
7;4	36%	32%	32%	0%	24%	76%
8;5	45%	27%	27%	0%	25%	75%
9;6	28%	46%	26%	0%	33%	67%
CLITIC						
6;6	64%	36%	0%	0%	100%	0%
7;4	84%	16%	0%	0%	58%	42%
8;5	69%	31%	0%	0%	67%	33%
9;6	78%	22%	0%	0%	67%	33%
DP						
6;6	63%	37%	0%	0%	92%	8%
7;4	83%	17%	0%	0%	91%	9%
8;5	71%	29%	0%	0%	100%	0%
9;6	100%	0%	0%	0%	100%	0%

Belletti and Contemori (2012) also analyzed the nature (null/overt) and the position (preverbal/post-verbal) of the subjects in object relatives produced by TD children in two different conditions: change-of-agent and change-of-action, as in our experiment (see table 8). However, Belletti and Contemori (2012) did not separate the analysis of subjects in gap ORs from resumptive ORs. Moreover, they did not take into consideration null subjects in the first part of their study, since according to them, null subjects would have been pragmatically wrong in this task, where lexical subjects are used in the lead-in told by the experimenter. However, we disagree from the authors, since null subjects are pragmatically correct in change-of-action, where

the focus is on the event rather than on the agents, even if lexical subjects are used in the introductory story.

The analysis of the distribution of subjects given by Belletti and Contemori (2012) partly differs from ours. Indeed, focusing on children aged 6-8, their participants show a preference for preverbal subjects in both conditions. While in our study, in change-of-agent the percentages of preverbal subjects are lower (6%-25%), and null subjects are never used in this condition, in Belletti and Contemori (2012), children use more preverbal subjects also in change-of-agent, and a considerable percentage of null subjects is certainly found in this condition (percentages of null subjects per each condition are not given by the authors but the total amount of preverbal and post-verbal subjects in change-of-agent is only about 40% -50%).

Table 8. Distribution of preverbal/post-verbal subjects in ORs in Belletti and Contemori (2012)

	CHANGE-OF-ACTION		CHANGE-OF-AGENT	
	PREVERBAL	POSTVERBAL	PREVERBAL	POSTVERBAL
3 - 3;11	26%	20%	20%	18%
4 - 4;11	27%	11%	24%	22%
5 - 5;11	7,5%	14%	14%	22%
6 - 6;11	20%	17%	22%	26%
7 - 7;11	33,5%	7%	36%	12%
8 - 8;10	28%	14%	24%	20%

In change-of-action, a preference for preverbal subjects is shown in 7 and 8-year-olds, differently from our experiment, where these age groups produce the same percentages of preverbal/post-verbal subjects in this condition. Also the behavior of six-year-olds is different from our age-matched participants: while our younger children had a very good performance in the distribution of subjects in both conditions (post-verbal subjects are never used in change-of-action, and conversely they are attested at 94% in change-of-agent), in Belletti and Contemori (2012), 6-year-olds do not show any preference, producing almost the same percentages of preverbal/post-verbal subjects in both conditions. We think that the preference for preverbal subjects in change-of-agent and the consistent production of null subjects even when these are not expected, are related to the fact that Belletti and Contemori

(2012) included resumptive ORs in the target sentences. Indeed, our results demonstrated that resumption is correlated to the use of null and preverbal subjects (in our study, preverbal subjects are predominant in change-of-agent, differently from gap ORs). Therefore, we think that a separate analysis between gap and resumptive ORs is needed in order to understand children's pragmatic and syntactic skills in the distribution of subjects.

V.V.III Null subjects in gap/resumptive ORs

Focusing on null subjects across different types of object relative clauses in change of action condition only, interesting observations can be made: in gap object relatives, the amount of null subjects decreases with age, especially between 6 and 7 years. On the other hand, in clitic resumptive object relatives, the amount of null subjects does not vary with age, with a mean percentage of 70%. Also DP resumptive ORs show an opposite pattern compared to gap ORs: null subjects constantly increase with age, ranging from 63% to 100%.

If we correlate the use of null subjects and the demonstrative *quello* as relative head in gap ORs in change-of-action only, we observe that an opposite pattern emerges in the younger and the older groups: indeed, the 6-year-olds preferred the use of light headed object relative clauses with null subject (80%) (12), whereas the 9/10 year-olds used much more headed object relative clauses with expressed subject (61%), as in (13).

(12) *Quella che stanno salutando.* (6;03)

The one that (they) are greeting.

TARGET: *Mi piace la maestra che (i vigili) salutano/fermano.*

I like the teacher that (the policemen) are greeting/halting.

(13) “*Mi piace la maestra che i vigili fermano*”. (9;08)

I like the teacher that the policemen are halting.

TARGET: *Mi piace la maestra che (i vigili) salutano/fermano.*

I like the teacher that (the policemen) are greeting/halting.

Differently from gap ORs, in clitic resumptives all groups of children strongly preferred light headed ORs with null subject, as in (14), attested at 50%-70%.

(14) “Quello che i bambini lo accarezzano”. (7;03)

The one that the children him-CLIT are caressing.

TARGET: (Mi piace) il gatto che i bambini accarezzano/mandano via.

(I like) the cat that the children are caressing/chasing away.

In DP resumptive ORs, all groups of children always chose *quello/quella* as relative head. Moreover, they showed a strong preference for light headed ORs with null subjects (15), as in clitic resumptive ORs. The 9/10-year-olds always produced light headed DP resumptives with null subject as in (15).

(15) “Quello che sollevano l’elefante”. (9;05)

The one that (they) are lifting up the elephant.

TARGET: (Mi piace) l’elefante che (i nonni) sollevano.

(I like) the elephant that (the grandparents) are lifting up.

Therefore, resumptive object relative clauses seem to be correlated with the use of a light head (*quello/a*) and a null subject. When null subjects are pragmatically wrong, children preferred to use preverbal subjects also in change-of-agent, differently from gap ORs. Post-verbal subjects are generally avoided by children in resumptive ORs, even in change-of-agent.

Also Belletti and Contemori (2012) analyzed the nature of the subject (overt/null), together with the use of pronominal post-verbal subjects, following a procedure different from the one used in our task. Indeed, they tried to create a discourse context which was pragmatically felicitous to elicit relative clause with either null or pronominal post-verbal subjects, using a lead-in as in (16). According to the authors, two different targets are expected when the introductory story in (16) is used, depending on whether the child chooses the first (*ricevere* ‘receive’) or the second verb (*preparare* ‘prepare’) of the introductory story. If he chooses *preparare*, for which an overt subject was used, a pronominal post-verbal subject is expected (18), differently from *ricevere*, which was not followed by an overt pronominal subject in the lead-in. In this case, a null subject is expected (17).

(16) EXPERIMENTER: C'è un bambino e ci sono due panini. Un panino l'ha ricevuto e un panino l'ha preparato *lui*. Secondo te il bambino quale panino vorrà mangiare per primo?

There is a boy and there are two sandwiches. The boy received one sandwich and he prepared the other sandwich. Which sandwich do you think he would like to eat first?'

TARGET 1: Verb [- S]

(17) Vorrà mangiare il panino che *pro* ha ricevuto.

want-fut eat-inf the sandwich that *pro* has received

'He will want to eat the sandwich that he received.'

TARGET 2: Verb [+ S]

(18) Vorrà mangiare il sandwich che *pro* ha fatto *lui*.

want-fut eat-inf the sandwich that *pro* has prepared *he*

'He will want to eat the sandwich that he prepared.'

Also in this task, Belletti and Contemori (2012) decided to count resumptive ORs as target sentences. Moreover, they counted as correct those relative clauses missing the relative head, as in previous experiments (Belletti and Contemori, 2010; Contemori, 2011, a. o.). Results are presented in table 9.

Table 9. Percentages of pronominal post-verbal and null subjects in Belletti and Contemori (2012).

Verb [+ S]	3 - 3;11	4 - 4;11	5 - 5;11	6 - 6;11	7 - 7;11
post-verbal	15/23 65%	28/38 74%	54/60 90%	68/75 91%	49/53 92,50%
null	8/23 35%	10/38 26%	6/60 10%	7/75 9%	4/53 7,5%
Verb [- S]					
post-verbal	3/49 6%	5/76 7%	5/61 8%	2/78 3%	1/49 2%
null	46/49 94%	71/76 93%	56/61 92%	76/78 97%	48/49 98%

As expected, children produced higher percentages of pronominal post-verbal subjects when they choose verb + overt subject, as in (18), while they used much more null subjects when they choose the verb without overt subject as in (17). In this condition, null subjects were almost at ceiling in all groups. Unfortunately, these data are not comparable to ours, since we used different elicitation procedures and we counted gap/resumptive ORs as separate answers (besides, we did not include relative clauses missing the relative head in target ORs).

V.VI Asymmetries in the RCs acquisition of typical and atypical development

Comparing typical and atypical development, interesting observations can be made: first, dyslexics and suspected dyslexics show the same subject/object asymmetry found in TD children and adults. Indeed, a statistical analysis revealed that diagnosed dyslexics were significantly more accurate in SRs than ORs production ($z = 7.084$, $p < 0.001$), as well as suspected dyslexics ($z = 7.142$, $p < 0.001$). This finding is in contrast with Contemori and Garraffa's (2013) results on children with SLI, who performed significantly worse in SRs production than their age-matched peers. The authors draw the conclusion that SRs production can be considered a marker of language impairment, since the difference in SRs between the two groups was even more consistent than ORs production. This seems not to be the case for children with dyslexia participating in our experiment. However, the smaller percentage of SRs in suspected dyslexics (90%) suggests that some of these children could also suffer from a Specific Language Impairment, overlapping with their undiagnosed dyslexia (see Guasti, 2013 for observations on the overlapping between SLI and dyslexia). It is however important to point out that children in Contemori and Garraffa (2013) are much younger than children in our experiment. This suggests that impairment in SR production might be considered a marker of language impairment in very young children, but not in older children.

In addition to that, both dyslexics and suspected dyslexics produced some subject relatives with DP resumption in the highest subject position (19), which is not attested in the production of TD children participating at our experiment.

(19) "A me piace **quello** che **il bambino** saluta le mucche". (8;03)

I like **the one** that **the boy** is greeting the cows.

TARGET: “(Mi piace) il bambino che saluta le mucche”.

(I like) the boy that is greeting the cows.

Importantly, subject resumption in the highest subject position was also observed in Hebrew-speaking children with SLI (Novogrodsky and Friedmann, 2006) and with hearing impairment (Friedmann et al., 2008). The authors suggested to treat resumption in the highest subject position as a marker of the language impairment of these children, who used resumption as a saving device when movement is impaired.

Also in the production of ORs, language impaired children seem to use resumption as a saving device: indeed, DP resumptive ORs were attested at 21% in dyslexics and 17% in suspected dyslexics, whereas the percentages of gap ORs were much lower (4% in dyslexics and 5% in suspected dyslexics vs. a mean of 23% in TD).

Moreover, non TD children produced a bigger amount of head inversions (23% in dyslexics, 35% in suspected dyslexics), SVO sentences (4% in dyslexics, 15% in suspected dyslexics) and ungrammatical sentences (4% in both groups). Suspected dyslexics seem to be more affected than diagnosed dyslexics: indeed, they used higher percentages of simple sentences as SVO and head inversions instead of the target ORs, and they produced very few passive object relatives (8%), even compared to dyslexics (31%). Besides, the few object relatives collected in suspected dyslexics were produced by the same child, who used the auxiliary *venire* in 3/7 PORs in the present perfect tense (20), which is not possible in Italian. Besides, one of these ungrammatical PORs also contained an incorrect preposition: the child used *con* (with) instead of *da* (by) to form the by-phrase (21).

(20) “Quello che viene stato pettinato”. (6;06)

The one that comes being combed.

TARGET: (Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) the dog that are combing the children/the hairdressers.

(21) “Quella che viene stata guardata con i gatti”. (6;06)

The one that comes being looked with the cats.

TARGET: (Mi piace) la scimmia che guardano i gatti/i bambini.

(I like) the monkey that are looking at the cats/the children.

As regards the status of the head in RCs in atypical development, whereas in SRs production non TD children produced almost the same percentages of headed/light headed RCs, in ORs production the use of light headed object relatives seems to be correlated to clitic or DP resumption, as in TD children. Indeed, dyslexic children produced all clitic and DP resumptives with *quello* as the relative head. Moreover, null subjects were used in all the resumptive object relatives produced in change-of-action (table 10). Therefore, like TD children, dyslexic participants showed to prefer light headed resumptives with null subjects. Conversely, dyslexics opted for an DP as relative head when they utter a gap object relative.

As regards suspected dyslexics, in clitic and DP resumptive ORs they only produced light headed ORs, as well as TD and dyslexic children. However, the use of the demonstrative *quello* seems not to be correlated exclusively with null subjects: indeed, in change-of-action, they totally produced 4 clitic resumptives, among which only one contained a null subject. In DP resumptives, they uttered 5/6 light headed ORs with null subjects and 1/6 with a post-verbal subject.

Table 10. Headed/light headed gap and resumptive ORs with either null or expressed subject in atypical development, in change-of-action only.

	DYSLEXIC CHILDREN				SUSPECTED DYSLEXIC CHILDREN			
	NP	NP PRO	QUELLO	QUELLO PRO	NP	NP PRO	QUELLO	QUELLO PRO
GAP OR	0	0	0	0	1/3	1/3	0/3	1/3
CLIT OR	0/3	0/3	0/3	3/3	0/4	0/4	3/4	1/4
DP OR	0/10	0/10	0/10	10/10	0/6	0/6	1/6	5/6

Despite the few object relatives produced, dyslexic children showed to have a good mastery of the syntactic and pragmatic knowledge required to place the subject in gap and resumptive ORs in the most suitable position, like TD children. Indeed, they totally produced 3 gap ORs, only in change-of-agent, and all of them presented a post-verbal subject, as expected. As regards clitic resumptive ORs, they produced 3/3 sentences with a null subject in change-of-action, which is again the expected type of response in this condition.

Also the suspected dyslexics had a good performance in the distribution of subjects in gap ORs, since they produced in change-of-action 2/3 gap ORs with a null subject and 1/3 with a preverbal one. Conversely, in change-of-agent, they produced one gap OR with post-verbal subject.

However, in clitic resumptives they produced 2/4 clitic resumptive ORs with a wrong clitic pronoun, as in (22) and (23).

(22) “**Quello** che gli orsi **li** accarezzano. (6;06)

The one that the bears are them-CLIT caressing.

(23) “**Quel bambino** che **gli** accarezzano gli orsi mi piace”. (6;11)

That child that him-CLIT_{masc sing dative} are caressing the bears I like.

Besides, one child produced a DP resumptive OR with a marginalized post-verbal subject in change-of-agent (24), which is pragmatically wrong in this condition, and one DP resumptive OR with a not marginalized post-verbal subject preceding the object in change-of-action (25). Neither TD nor dyslexic children ever produced a sentence like the one in (25).

(24) “Quello che pettinano il cane, i bambini”. (7;01)

The one that are combing the dog, the children.

TARGET: (Mi piace) il cane che pettinano i bambini/i barbieri.

(I like) The dog that are combing the children/the hairdressers.

(25) “Quello che accarezzano i bambini il gatto”. (7;01)

The one that are caressing the children the cat.

TARGET: (Mi piace) il gatto che (i bambini) accarezzano/mandano via.

(I like) the cat that (the children) are caressing/chasing away.

The typologies of errors produced by suspected dyslexics, such as the use of wrong clitic pronouns (22-23) and wrong prepositions (21), errors in the tense morphology (20-21), the use of DP resumption in the highest subject position (19), and the higher number of SVO sentences, head inversions, resumptives and ungrammatical sentences when ORs were targeted, seem to suggest that the suspected dyslexia of these children overlaps with SLI.

Indeed, the same typologies of errors have been detected in other studies investigating linguistic deficits in SLI and hearing-impaired children (Jakubowicz, Nash, Rigaut, Gerard, 1998; Novogrodsky and Friedmann, 2006; Friedmann et al.,

2008; Contemori and Garraffa, 2010; Guasti, 2013, a. o.). Moreover, the fact that SRs with subject resumption and high percentages of DP resumptive ORs are also found in dyslexic children, let us speculate, in line with Guasti (2013), that some of our dyslexic participants also suffer from SLI, or that dyslexia presents some characteristics in common with Specific Language Impairment.

For instance, Friedmann et al. (2008) found that hearing-impaired children produced a higher percentage of resumptive ORs compared to controls (42% vs 30%) and a much lower percentage of gap ORs (19% vs 64%). Besides, the amount of ungrammatical sentences in hearing-impaired children was very high (24% vs 1%). In some of the ungrammatical sentences children used the wrong resumptive pronoun, as in (26).

(26) Ani raciti lihiot yeled Se-ha-kelev melakek oti.

I wanted to be a child that the dog licks me.

In the same study, the authors elicited RCs with a picture description task: hearing-impaired children produced a higher amount of resumptive ORs (58%) and a lower amount of gap ORs (17%) compared to TD children (34% and 60%, respectively). When SRs were targeted, hearing-impaired children produced ungrammatical RCs with a resumptive pronoun or doubling of the relative head in the highest subject position (7% of times). Conversely, the TD participants produced less than 2% of their subject relatives with a resumptive pronoun, and did not make any doubling errors. Moreover, a lower amount of SRs is produced by hearing-impaired participants (87% vs 98% in TD), a percentage similar to the one collected in our study with suspected dyslexics (90%).

Novogrodsky and Friedmann (2006) analyzed the production of subject/object RCs in SLI children: they found that SLI produced significantly fewer SRs both in the preference (94% vs 99%) and the picture description task (83% vs 98%). Interestingly, SLI produced SVO sentences, as in (27), instead of a SR 6% of times, whereas this response was not found in the control group.

(27) ha-xayelet ha-zot malbisha et ha-axot

the-(female)-soldier the-this dresses ACC the-nurse

This soldier dresses the nurse.

Also in our study, suspected dyslexics produced SVO sentences instead of SRs (2%), an error which was not detected in the other participants, nor TD neither dyslexics.

Again, also in Novogrodsky and Friedmann (2006), SLI children produced subject resumption in the higher subject position with either a resumptive pronoun (6%) or doubling of the relative head (5%), in line with Friedmann et al. (2008) and our experiment. When ORs were targeted, SLI produced a consistent amount of SVO sentences or sentence fragments (11% in the preference, 4% in the picture description task, vs 0% in TD), like our suspected dyslexics (15% of SVO and 5% of incomplete sentences).

The use of simple declarative sentences was confirmed in a study of Contemori and Garraffa (2010) on Italian-speaking SLI children who were younger than our participants (4;5-5;9). The authors found that language impaired participants produced fewer SRs than TD participants (only 12,5%) and that they very often used declarative sentences instead of the target (26%). This type of response was used also when ORs were elicited (38%).

In a study of 2013, Guasti investigated the use of clitic pronouns in dyslexic children and found that some of them were dramatically impaired in clitic production, since they used clitics only in 20% of their sentences (vs 90% of controls). The same percentage of children was also impaired in object and subject *which*-questions production. Guasti (2013) speculates that these children could suffer from a Specific Language Impairment associated to their dyslexia, or that maybe dyslexic children sometimes shows the same linguistic deficits as SLI children.

V.VII The repetition task in typical and atypical development

V.VII.I The repetition task in typical development

In the repetition task all groups of TD children performed above chance in both conditions, with an increase in the total amount of correct imitated ORs according to age (from 73% to 90%). G1 was significantly less accurate than all groups of older children (G2 $z = 2.153$, $p < 0.05$; G3 $z = 3.44$, $p < 0.001$; G4 $z = 2.911$, $p < 0.01$). The controls performed almost at ceiling (98%), and were significantly more accurate than G1 ($z = 3.076$, $p < 0.01$) and G2 ($z = 2.130$, $p < 0.05$).

The most common error type in change-of-agent was the transformation of the target OR into a SR through the inversion of the theta-roles (66%), as in (28), since the child only needed to omit the plural verbal suffix *-no*, which determines the agreement between the plural embedded subject and the verb, in order to turn the OR into a SR.

(28) “Mi piace la bambina che bacia i cani”. (6;08)

I like the girl that is kissing the dogs.

TARGET: Mi piace la bambina che baciano i cani.

I like the girl that are kissing the dogs.

In change-of-action, the most frequent error typologies were the transformation of the target OR into a SR through head inversion (29) and ungrammatical sentences (30). Indeed, a higher amount of ungrammatical sentences are produced in the change-of-action condition than in change-of-agent condition (25% vs. 16%). Clitic (31) and DP resumption (32) are uttered only in the change-of-action condition. Clitic resumption is attested at a considerable percentage (11%), whereas DP resumption only at 1%.

(29) “Mi piacciono gli orsi che accarezzano il bambino”. (7;09)

I like the bears that are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(30) “Mi piace il bambino che stanno accarezzando l’orso”. (6;03)

I like the child that are caressing the bear.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(31) “Mi piace il cane che i papà lo sporcano”.

I like the dog that the fathers it-CLIT_{masculine sing} are soiling.

TARGET: Mi piace il cane che i papà sporcano.

I like the dog that the fathers are soiling.

(32) “Mi piace il vigile che mordono il vigile”. (6;05)

I like the policeman that (they) are biting the policeman.

TARGET: Mi piace il vigile che i cani mordono.

I like the policeman that the dogs are biting.

Looking at the position of the embedded subject, children seem to be facilitated by a post-verbal rather than a preverbal subject, when they are administered an imitation task. First, there are more cases in which they locate a preverbal subject in a post-verbal position (13% in the change of action condition), than cases where they decide to locate a post-verbal subject in a preverbal position (3% in the change of agent condition). Second, younger children, who had more difficulties in imitating object relatives, scored higher percentages of accuracy in change of agent condition, where ORs have a post-verbal subject (77% vs. 68% in 6-year-olds)

Interestingly, children showed to know pragmatical rules even when they do not correctly imitate the target: indeed, they omit the subject only in the change of action condition (4% vs. 0% in change of agent), which is pragmatically correct, and conversely, they use more passive object relatives in the change of agent condition (6% vs. 1%), maintaining the contrastive focus on the agent with a by-phrase (which was present in all the PORs produced).

V.VII.II The repetition task in atypical development

Even if language impaired children performed above chance in both conditions, they reached much lower percentages of accuracy compared to TD children (68% in diagnosed dyslexics and 65% in suspected dyslexics, compared to a mean of 86% in TD children). Indeed, diagnosed dyslexics were significantly less accurate than G2 ($z = -2.131$, $p < 0.05$), G3 ($z = -2.980$, $p < 0.01$) and G4 ($z = -2.717$, $p < 0.01$), and suspected dyslexics were significantly less accurate than G3 ($z = 2.204$, $p < 0.05$) and G4 ($z = -2.161$, $p < 0.05$).

As regards dyslexic children, the most common error typology in the change of agent condition was the inversion of the theta-roles (7/10 sentences). This pattern was the same found in TD children. The other three errors were produced by the same child, aged 8;05, and all of them consisted in passive object relatives with the auxiliary *venire* plus a by-phrase.

In the change of action condition, dyslexic children wrongly repeated 13 items: 1 SR with head inversion, 2 ungrammatical sentences (33), 2 ORs turned into SRs using a singular inflected verb and a focalized preverbal object (34), 3 ORs with post-verbal subject, 3 ORs with clitic resumption (35), and finally, one passive object relative with the auxiliary *venire* plus a by-phrase. Interestingly, the two ungrammatical sentences produced by dyslexic children consisted both in the wrong use of the definite article: a masculine, singular one (*il*) instead of a masculine plural one (*i*). This error was probably related to the fact that the Italian NP *papà* can receive both a singular and a plural interpretation. A correct use of the definite article is what determines the singular or plural agreement of this noun with the verb. The two children correctly inflected the embedded verb but chose the wrong definite article.

(33) “Mi piace il cane che **il** papà sporcano”. (8;05)

I like the dog that the masculine sing fathers are soiling.

TARGET: Mi piace il cane che **i** papà sporcano.

I like the dog that the fathers are soiling.

(34) “Mi piace la maestra che i vigili ferma”. (8;05)

I like the teacher that the policemen is halting.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

(35) “Mi piace il gatto che lo mandano via”. (8;05)

I like the cat that it-CLIT masculine sing (they) are chasing away.

TARGET: Mi piace il gatto che i bambini mandano via.

I like the cat that the children are chasing away.

Like TD children, dyslexics only produced clitic resumptive ORs in change-of-action and preferred post-verbal subjects (3 children produced an OR with a post-verbal instead of preverbal subject, whereas none of the dyslexics showed the opposite behavior).

As regards children with suspected dyslexia, 4/7 made at least one error in the imitation task. In all, they made 13 errors in change-of-agent and 16 errors in change-of-action.

In the change of agent condition, the most frequent error typology was again the inversion of the theta-roles (6 sentences). Moreover, they produced one SVO sentence, one ungrammatical sentence (36), three head inversions, one OR with opposite mismatch (plural head, singular embedded subject) (37), and one OR with DP resumption (38).

(36) “Mi piacciono la bambina che baciano i cani”. (9;07)

I like plural inflected verb the girl sing subj that are kissing the dogs.

TARGET: Mi piace la bambina che baciano i cani.

I like the girl that are kissing the dogs.

(37) “Mi piacciono i cavalli che tocca la scimmia”. (9;07)

I like the horses that is touching the monkey.

TARGET: Mi piace il cavallo che toccano le scimmie.

I like the horse that are touching the monkeys.

(38) “L’elefante che sollevano l’elefante”. (9;07)

The elephant that (they) are lifting up the elephant.

TARGET: Mi piace l’elefante che sollevano le mamme.

I like the elephant that are lifting up the mothers.

In the change of action condition, the most frequent error was turning the target OR into a SR through head inversion (9 sentences); they also produced 3 ungrammatical sentences (39), 2 ORs with clitic resumption and one with DP resumption (40). Importantly, one of the ORs with clitic resumption contained a wrong clitic pronoun (the singular masculine *lo* instead of the singular feminine *la*) (41).

(39) “Mi piacciono l’elefante che il nonno sollevano”. (9;07)

I like the elephant that the grandfather are lifting up.

TARGET: Mi piace l’elefante che i nonni sollevano.

I like the elephant that the grandparents are lifting up.

(40) “Mi piace **il bambino** che gli orsi accarezzano **il bambino**”. (6;11)

I like the child that the bears are caressing the child.

TARGET: Mi piace il bambino che gli orsi accarezzano.

I like the child that the bears are caressing.

(41) “Mi piace **la maestra** che i vigili **lo** fermano”. (6;11)

I like the teacher that the policemen him-CLIT are halting.

TARGET: Mi piace la maestra che i vigili fermano.

I like the teacher that the policemen are halting.

Also in the repetition task, some characteristics of suspected dyslexics are confirmed: the preference for DP resumption, even in those cases where it is avoided by the other participants, and the use of wrong clitic pronouns. Moreover, suspected dyslexics and diagnosed dyslexics correctly repeated a lower number of ORs compared to TD, confirming the importance of the repetition task to investigate the children’s ability to reconstruct some complex syntactic structures, such as relative clauses (Friedmann and Lavi, 2006).

In Contemori and Garraffa’s (2010) study, SLI children repeated significantly much fewer SRs and ORs compared to controls. The authors demonstrated a dramatically impaired ability to repeat the target (0,8% in SRs, 1,6% in ORs), and the SLI children’s preference for declarative clauses, as in the elicitation task. However, their SLI children are much younger than ours, who managed to repeat RCs above chance.

CHAPTER VI

CONCLUSIONS

With this experiment, we elicited subject and object restrictive relative clauses in typically and atypically developing children, in order to verify:

- whether the task modifications applied to the Preference Task let us collect more object relative clauses, compared to previous studies on Italian (Utzeri, 2006; Volpato, 2010; Contemori, 2011, a. o.), and a higher amount of headed relatives (vs light headed relative clauses).
- whether Developmental Dyslexia affects language acquisition, specifically subject and object relative clauses, as it has been found for SLI (Stavarakaki, 2002; Novogrodsky and Friedmann, 2006; Contemori and Garraffa, 2010) and hearing-impaired children (Friedmann and Sztermann, 2006; Friedmann et al., 2008; Volpato, 2010, a. o.).

Moreover, we aimed at comparing the production of gap and resumptive object relative clauses, both in typical and atypical development, in order to detect possible asymmetries between the two structures regarding the status of the head and the distribution of embedded subjects.

Results partly confirmed our expectations, since TD children produced a higher amount of target gap ORs compared to Utzeri (2006) and Contemori (2011), and a lower amount of resumptive ORs compared to Utzeri (2006), Contemori (2011) and Volpato (2010).

However, we did not collect a higher number of headed relative clauses, as expected (considered that we always changed the head of the relative clause, we hoped to induce the child to produce more ORs with lexical DP as a relative head). Indeed, the choice of a headed or a light headed relative clause seems to be motivated:

- by the age of the children: the use of the demonstrative pronoun *quello* decreases with age in gap relative clauses, both in SRs (from 72% to 30%) and ORs (from 93% to 29%);
- by the choice of a gap or a resumptive OR. Indeed, in clitic resumptive ORs, all groups of children produced a light headed OR around 80% of times, while in DP resumptive ORs, they always chose “*quello*” as relative head.

In a RM approach à la Friedmann, Belletti and Rizzi (2009), the preference for a light head could be attributed to the necessity to avoid a RM violation in ORs with a DP subject. However, since light-headed relative clauses are found in both SRs and ORs and they show a similar tendency in language development, a different approach must be looked for. The preference of younger children for light headed relative clauses can be accounted for with Citko’s (2004) proposal that this type of relatives are less complex and computationally less demanding, since they involve a $[_{DP} D^0 CP]$ structure, whereas headed relatives involve an extra nominal layer.

Since resumptive ORs must be themselves seen as less complex and computationally less demanding structures than gap ORs, the correlation with a light head is not surprising.

As regards the position of the embedded subjects, we found that participants master the syntactic and pragmatic knowledge required to realize the subject and to place it in the most suitable position according to the discourse context.

In gap object relatives, children correctly preferred to use preverbal (35%) or phonologically null subjects (42%) in change-of-action, where the subjects are strongly topicalized, even if a certain amount of post-verbal subjects are produced (24%). Conversely, in change of agent, where the focus is on the agent rather than on the verb, children preferred post-verbal subjects (74%) over preverbal ones (26%), whereas null subjects were never found. Interestingly, the 6-year-olds performed better than all the groups of older children: in change-of-action, they use 12% of times a preverbal and 88% of times a null subject, while they never used post-verbal subjects here; conversely, in change-of-agent, they used the highest percentage of post-verbal subjects (94%).

A different pattern emerges in clitic and DP resumptive ORs, where each age group showed a preference for null subjects in change-of-action and for preverbal

subjects in change-of-agent. Post-verbal subjects were almost never produced in DP resumptives, neither in change-of-action, nor in change-of-agent.

Gap and resumptive ORs also differ in the amount of null subjects produced: in gap object relatives, the amount of null subjects decreases with age, especially between 6 and 7 years. On the other hand, in clitic resumptive object relatives, the amount of null subjects does not vary with age, with a mean percentage of 70%. Also DP resumptive ORs show an opposite pattern compared to gap ORs: null subjects constantly increase with age, ranging from 63% to 100%.

If we correlate the use of null subjects and the demonstrative *quello* as relative head in gap ORs in change-of-action only, we observe that an opposite pattern emerges in the younger and the older groups: indeed, the 6-year-olds preferred the use of light headed object relative clauses with null subject (80%), whereas the 9/10 year-olds used much more headed object relative clauses with expressed subject (61%). Differently from gap ORs, in clitic resumptives all groups of children strongly preferred light headed ORs with null subject, always attested above chance.

To sum up, resumptive object relative clauses seem to be correlated with the use of a light head (*quello/a*) and a null subject. When null subjects are pragmatically wrong, children preferred to use preverbal subjects also in change-of-agent, differently from gap ORs. Post-verbal subjects are generally avoided by children in resumptive ORs, even when they would be pragmatically correct. Since resumptive ORs are computationally less demanding than gap ORs, we might speculate that the use of a light head and a null subject in clitic/DP resumptives is related to the need (of especially younger children) to use less complex and computationally less demanding structures.

Comparing TD and non TD children's production, interesting observations can be made. First, the well known subject/object asymmetry was found for both groups³, even if dyslexic and suspected dyslexic participants produced much fewer object relatives than TD children (4% in dyslexics and 5% in suspected dyslexics vs. a

³ However, the smaller percentage of SRs in suspected dyslexics (90%) suggests that some of these children could also suffer from a Specific Language Impairment, overlapping with their undiagnosed dyslexia (see Guasti, 2013 for observations on the overlapping between SLI and dyslexia).

mean of 24% in TD). The most striking result was the much higher amount of DP resumptive ORs produced by non TD children (21% in dyslexics and 17% in suspected dyslexics) compared to TD (5%). Moreover, non TD children produced a bigger amount of head inversions (23% in dyslexics, 35% in suspected dyslexics), SVO sentences (4% in dyslexics, 15% in suspected dyslexics) and ungrammatical sentences (4% in both groups). Suspected dyslexics seem to be more affected than diagnosed dyslexics: they used higher percentages of simple sentences as SVO (they produced SVO sentences also when SRs were targeted (2%), a type of error which was not detected in the other participants) and head inversions instead of the target ORs, and they used very few passive object relatives (8%), even compared to dyslexics (31%).

Importantly, the use of subject resumption in the highest subject position was only found in dyslexics and suspected dyslexics. This divergent pattern compared to typical development was also observed in Hebrew-speaking children with SLI (Novogrodsky and Friedmann, 2006) and with hearing impairment (Friedmann et al., 2008). The authors suggested to treat resumption in the highest subject position as a marker of the language impairment of these children, who used resumption as a saving device when movement is impaired.

The much higher percentages of DP resumptive ORs and the difficulty experienced in producing gap ORs, together with other important factors described so far (preference for the SVO order, incomplete or ungrammatical sentences; subject resumption in the highest subject position; use of wrong clitic pronoun in resumptive ORs and wrong tense in PORs, see chapter 5) let us speculate that dyslexia does influence the acquisition of complex syntactic structures such as restrictive relative clauses. Indeed, a very similar pattern has been found in the production of SLI (Stavrakaki, 2002; Novogrodsky and Friedmann, 2006; Contemori and Garraffa, 2010), and hearing-impaired children (Friedmann et al., 2008; Volpato, 2010). Stavrakaki, for instance, found that SLI participants (mean age 7;38) preferred the SVO order (63% vs 30% in TD) and produced some DP resumptives. In Friedmann and Sztermann (2006), the 69% of ORs produced by hearing-impaired participants contained a resumptive pronoun (vs 32% in TD) and only 80% of correct SRs were produced (vs 100% in TD). In Volpato (2010), only hearing-impaired children used incomplete or ungrammatical sentences, and preferred clitic and DP

resumptives (43% and 32% respectively, out of the total amount of ORs produced) instead of gap ORs (24%).

The use of resumption is largely attested cross-linguistically in children's production, and is also documented in several languages accepting resumptive pronouns or DPs as a standard strategy to produce relative clauses (see Cinque, 2011). We think, in line with Suñer (1988) and Cinque (2011), that resumption is an UG parameter explored by children when acquiring syntax. Cinque's (2011) study on double headed relative clauses across different languages shows for instance that DP resumptives are attested as fully grammatical constructions in an adult language, Kombai, (Trans-New Guinea; Papua, Indonesia), as was initially reported by de Vries (1993). However, when children massively use resumption in the formation of relative clauses, like our non TD participants, this could be a consequence of their language impairment (Friedmann et al., 2008). Indeed, resumptive ORs (usually preferred by younger children also in true resumptive languages) are computationally less demanding structures compared to gap ORs.

The difficulty in producing gap object relative clauses is also demonstrated by the results of the repetition task: both dyslexic and suspected dyslexic participants repeated significantly fewer correct object relatives compared to TD children (68% in diagnosed dyslexics and 65% in suspected dyslexics, compared to a mean of 86% in TD children), in line with Contemori and Garraffa's (2010) study on Italian-speaking SLI children⁴. Also in the repetition task, they sometimes used DP resumption and the wrong clitic pronoun when producing a clitic resumptive OR instead of the target.

On the other hand, non TD children showed to master the syntactic and pragmatic knowledge required to place the subject in the most suitable position according to the discourse context, and always chose *quello* as relative head in clitic and DP resumptive ORs, similarly to TD children (in gap ORs, both groups used similar percentages of headed/light headed ORs). However, suspected dyslexics

⁴ In Contemori and Garraffa's (2010) study, SLI children repeated significantly much fewer SRs and ORs compared to controls. The authors demonstrated a dramatically impaired ability to repeat the target (0,8% in SRs, 1,6% in ORs), and the SLI children's preference for declarative clauses, as in the elicitation task. However, their SLI children are much younger than ours, who managed to repeat RCs above chance.

produced 2/4 clitic resumptive ORs using the wrong clitic pronoun, and one DP resumptive OR with a not marginalized post-verbal subject (in change-of-action), a type of sentence which was never produced neither by TD nor by dyslexic children.

To sum up, results seem to demonstrate that a more specific investigation of the syntactic deficits in the production of Italian-speaking dyslexic children is needed. Recently, Zachou et al. (2012) and Guasti (2013) have found that complex morpho-syntactic structures, such as clitic pronouns and *which*-questions, are impaired in some children affected by DD. More specifically, Guasti (2013) investigated the use of clitic pronouns in dyslexic children and found that some of them were dramatically impaired in clitic production, since they used clitics only in 20% of their sentences (vs 90% of controls). The same percentage of children was also impaired in object and subject *which*-questions production. Therefore, the author speculates that these children could suffer from a Specific Language Impairment associated to their dyslexia. In line with Guasti (2013), we think that one aim of future linguistic research should be to understand why dyslexia and SLI sometimes overlaps, and to what extent. As reported by Guasti (2013), possible explanations could be that DD and SLI are on a continuum and differ in terms of severity (Tallal et al. 1997), or they are separate disorders that may appear in the same child due to comorbidity (Catts et al. 2005), or the diagnosis of dyslexia has to be used only for phonological limitations, whereas SLI children present both phonological and cognitive impairments (Bishop and Snowling, 2004).

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Estratto per riassunto della tesi di dottorato

Studente: Margherita Pivi

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Dottorato: Scienze del Linguaggio

Ciclo: 26°

Titolo della tesi: On the acquisition of Italian restrictive relative clauses in typical and atypical development

Abstract:

La tesi presenta i risultati di un esperimento di produzione elicitata di frasi relative restrittive in bambini italiani dai 6 ai 10 anni di età, con sviluppo tipico o dislessia. L'esperimento si inserisce in un progetto più ampio di elaborazione di un nuovo test di produzione volto a elicitare le seguenti strutture sintattiche: frasi relative soggetto/oggetto, frasi scisse soggetto/oggetto, passive e domande. Nella tesi ci focalizziamo sull'acquisizione delle relative restrittive nelle varie fasce d'età e sulle asimmetrie riscontrate in presenza di sviluppo tipico/atipico, individuando linee di demarcazione utili alla pratica clinica. Inoltre, presentiamo importanti modifiche apportate al test della Preferenza elaborato da Novogrodsky e Friedmann (2006) per la produzione elicitata di frasi relative nell'ebraico, e successivamente adattato per il suo utilizzo in vari studi sull'italiano (Utzeri, 2006; 2007; Volpato, 2010; Contemori, 2011; Guasti et al., 2012), nonché nel presente studio. In questo modo, ci inseriamo nell'acceso dibattito sull'acquisizione delle frasi relative fornendo dati importanti sulle differenze riscontrabili in acquisizione in presenza di sviluppo tipico o atipico. Diversamente dagli studi sopra citati, abbiamo riscontrato e analizzato delle asimmetrie fra relative con gap e relative resuntive, riguardanti la natura della testa (quello/DP lessicale) e la posizione dei soggetti (preverbal/postverbal); inoltre, questo è il primo studio sull'Italiano che presenta dati sulla natura della testa relativa in bambini normodotati/con dislessia, individuando differenze nella produzione fra i vari gruppi di età.

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Abstract:

This work presents the results of an elicited production experiment on Italian restrictive relative clauses, administered to 116 children aged 6-10 with typical development, and 14 children with atypical development aged 6-11 (7 with a diagnosis of dyslexia, 7 with suspected dyslexia, that is with evident school difficulties). The experiment was conceived within a wider project held at the Department of Linguistics and Comparative Cultural Studies of the Ca' Foscari University of Venice, aiming at eliciting different syntactic structures (cleft sentences, relative clauses, direct wh-questions and passive sentences) in the same groups of children. In our work, we concentrate on the acquisition of relative clauses, analyzing important asymmetries between typical and atypical development. Moreover, we present two task modifications included in Novogrodsky and Friedmann's (2006) Preference Task, initially designed for Hebrew and adapted for several experiments on Italian (Utzeri, 2006; 2007; Volpato, 2010; Contemori, 2011; Guasti et al., 2012). Differently from the studies quoted above, we also analyzed the asymmetries between gap and resumptive ORs, regarding the status of the head (demonstrative pronoun *quello*/lexical DP) and the position of embedded subjects (preverbal/post-verbal). Importantly, this is the first study on Italian presenting data on the nature of the relative head, and the differences in elicited production between TD children and children with Developmental Dyslexia.