

GENUINE VERSUS SUPERFICIAL RELATIVES IN FRENCH: THE DEPTH OF EMBEDDING FACTOR

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Abstract: *This article takes up economy/complexity of linguistic derivations, as classically illustrated in relative clauses. Relative clauses in French are of particular interest in this regard in that the syntax of surface relative clauses in fact varies in complexity, some of them corresponding to real relative clauses and others involving a flatter structure. We propose a syntactic analysis of superficial relatives, taken to include various kinds of cleft and presentational constructions such as c'est and il y a, arguing that they are "flatter" than genuine relatives in structurally definable ways. In particular, we demonstrate that these structures do not involve genuine recursion, of either DP or of a full CP. We argue that study of spontaneous language samples of typically developing (TD) children and adolescents and children and adolescents with Specific Language Impairment (SLI) provides crucial evidence for the fundamental nature of this key aspect of complexity, depth of embedding, especially when related factors such as intervention in dependencies are controlled for. The acquisition of relative clauses in French was examined in the following groups: 12 TD 6-year-olds, 12 TD 8-year-olds, 12 TD 11-year-olds, 12 TD 14-year-olds) and 16 10- to 12-year-olds with SLI.*

Keywords: relative clauses, embedding, French Clefts

1. Complexity Effects in Relative Clauses

The notion of economy/complexity of linguistic derivation has recently come to the forefront of work on language acquisition and impairment. Inherent in this notion is the idea that elements and operations manipulated in linguistic computation have an impact on the efficiency of linguistic performance and provide an explanation for the order of emergence and frequency of occurrence of different constructions in child language. Simplistically put, the idea is that an increase in the number of elements manipulated and/or the number of manipulations is linked to a decrease in linguistic performance. Different ways of instantiating this basic intuition have been proposed, notably within generative approaches which, in recent formulations, permit close parallels between syntactic derivation, processing, and limitations in working memory. These instantiations have targeted various aspects of syntactic computation which appear to be relevant. This article will focus on one of these--depth of embedding.

1.1. Theoretical and empirical background

One classical locus of complexity effects is relative clauses (RC). These show that, in the case of center embedding, the factor of depth of embedding further exacerbates processing difficulty even in adults, as is illustrated in (1b), which is exceedingly difficult to interpret, compared to (1a).

- (1) a. The administrator who the intern supervised lost the medical reports.
b. #The administrator who the intern who the nurse supervised had bothered lost the medical reports. (adapted from Gibson 1998)

Kimball (1973) proposed that complexity be calculated in terms of the number of incomplete clauses that must be stored in memory at any given moment in parsing, a characterization which would seem to capture well the intuition behind the idea that depth of embedding affects processing. This might be translated in phase theory (Chomsky 2005), as the activation of phase edges which are needed to compute cross-phase dependencies in the course of a derivation. Related to the notion of depth of embedding is the fact that RCs involve recursion, a property which is particularly important here, and to which we will return.

In addition to the factor of depth of embedding, RCs also display a dissociation between subject- and object-extracted relatives (SR, OR), as in (2a) – (2b), with the latter giving rise to longer reaction times, more comprehension errors, etc.

- (2) a. The cook that helped the plumber quit work after a month
b. The cook that the plumber helped quit work after a month (Gordon et al. 2001)

The factor illustrated in (2b) has received considerable recent attention. What is at issue here is the notion of distance and how this is computed. In the processing literature, this is taken to be due to “interveners”. Gibson (1998, 2000) advanced the idea that dependencies which contain intervening new referents make computation difficult, and Gordon et al. (2001) referring to Bever (1970) and Crowder (1976) emphasized that it is the similarity of the intervener to the antecedent which is at the base of this intervention effect. A structural counterpart of these insights appeared in Rizzi (1990, 2004, 2013) as a particular instance of the syntactic locality constraints unified by Relativized Minimality (RM).¹

¹ The basic idea is that in a configuration like X...Z...Y, “a local structural relation cannot hold between X and Y if Z is a potential bearer of the relevant relation and Z intervenes between X and Y” (Rizzi 2004). Potential bearers Z of the relevant relation are characterized as being of the same structural type as X. Defining constituents, or more precisely specifiers, as being of the same structural type, Rizzi proposes four such types with specific features: argumental specifiers (person, number, gender, case); quantificational specifiers (Wh, Neg, measure, focus...); modifiers (evaluative, epistemic, Neg, frequentive...manner...); topics. Starke (2001) observed that potential interveners which only contain a subset of the features of the antecedent, do not act as interveners, so that a configuration such as (i) +A+B...A ...<+A+B> (where A and B are sets of features) does not block the relevant structural relation. This latter configuration has been exploited in the explanation of difficulties in the acquisition of relative clauses in recent discussion (Friedmann et al. 2009). More recently Beletti et al. (2012) highlighted the crucial impact on intervention of similarity of linguistic features attracting movement as opposed to features involved in cognitive computation which have an impact on working memory or theta-role assignment. Note also that the feature of animacy has received much attention in attempts to determine its role in intervention effects (Mak et al. 2002; Kidd et al. 2007; Grillo 2008; Arosio et al. 2011) and that the purely formal characterization of the intervention effect as “NP-restriction” has been critically evaluated by Goodluck (2010).

The SR-OR dissociation is well known in the acquisition literature. Friedmann et al. (2009), taking up the particular sensitivity children show for this dissociation, start from the idea that RM seems to operate in a stricter fashion in children than in adults, much as in Grillo's (2008) work on adults with aphasia. In other words, the difficulties children experience with ORs are due to intervention of the subject. In adult grammar the DP subject does not interfere in the strict sense of blocking the derivation since the relevant feature shared by the relative operator and its trace is the *wh*-feature of the relative operator, which is not a feature of the subject. Gordon et al. (2001) showed, however, that subjects, and full DP subjects in particular, have an effect on processing cost, making reading times and interpretative errors increase in typical adults. Investigating Italian and Hebrew children's production and comprehension of SRs and ORs, Friedmann et al. argued that it is a grammatical feature, the NP-restriction on the DPs, that makes it difficult for adults to relate the gap to its antecedent and, in child grammar, blocks this relation altogether, as illustrated in (3).

- (3) a. Show me the cow that ~~the cow~~ is kissing the chicken [not problematic]
 b. Show me the elephant that the lion is wetting ~~the elephant~~ [problematic or blocked]

Apart from the purely structural factors of depth of embedding and interveners between filler and gap, information structure also plays a role in performance on relatives: Topichood in particular, has been shown to greatly reduce the asymmetry in the production (Fox and Thompson 1990; Zubin 1979) and comprehension of subject and object extracted relatives (Frauenfelder et al. 1980, for early findings, and Mak et al., 2002, 2006, 2008 for recent discussion). It is likewise remarkable that, as will be shown below, some of the less deeply embedded structures employed in French relativization are tied to specific discourse functions such as introduction of new discourse topics (Jisa & Kern 1998; Lambrecht 1988).

1.2. Levels of embedding of relative clauses

As we have reviewed above, multiple embedding in center-embedded relatives is a source of difficulty even for typical adults (see (1) above). Hamann et al. (2007), Delage et al. (2008), and Tuller et al. (2012) suggest that depth of embedding is an important variable to consider in defining the complexity of subordinate clauses in general, and RCs in particular. The hypothesis that embedding is part of the definition of syntactic complexity is also developed and supported by Soares (2006) on the basis of data from child Portuguese which shows in particular that clauses without embedding emerge before clauses with embedding. Intuitively, an RC in a DP that is a constituent of the matrix clause is less complex than an RC in a DP that is a constituent of another subordinate clause, in that the former (which we will refer to as a Level-1 RC, as in (4a)) is less deeply embedded than the latter (which would be of Level-2 or higher, as in (4b)). And, of course, if the subordinate clause is itself an RC, as in (4c), then this is relative recursion.

- (4) a. Lea knows the man [_{CP} who lives in Paris] Level-1 RC
 b. Lea knows [_{CP} that we saw the man [_{CP} who lives in Paris]] Level-2 RC
 c. Lea knows the man [_{CP} who lives in the city [_{CP} that is the capital of France]] Level-2 RC

As mentioned above, in Kimball's (1973) calculation of complexity, it is the number of incomplete clauses that must be stored in memory. If clauses are the important notion, it follows that an RC in a DP which forms an utterance by itself, and therefore is not a constituent of a matrix clause, will be simpler than a Level-1 RC. Such an RC (which we refer to as a 0-level RC) is, in a certain sense mono-clausal, in that it is not embedded within another clause, though it does display DP recursion (see Goodluck & Tavakolian 1982). DP utterances of this type (as in (5)) are fully discourse-felicitous, for instance, as answers to questions.

(5) (Who's that?) The guy [_{CP} who lives in Paris] 0-Level RC

There are other syntactic configurations in which embedding of an RC might also be considered to be shallower, following this simple definition crucially involving embedding of an RC inside a clause. One such case might be that of a left- or right-dislocated DP with an RC, since in these cases, the DP is not embedded within the matrix clause, but rather adjoined to it (see Kiparsky 1994 with similar criteria for the historical development of subordinate clauses in English from adjunction to embedding). In this sense, an RC in a dislocated DP would also be a 0-level RC.

(6) [[_{DP} That guy [_{CP} who lives in Paris,]] [_{IP} he never comes to Tours anymore]]

We will be arguing in this paper, that, in French, depth of embedding can be observed by applying the above scale (0-level, level-1, level-2, etc.), but also in a number of superficial relative constructions entailing a flatter structure in that either there is no embedding in a DP or no embedding in a clause, i.e. an IP or CP, or both.

1.3. Acquisition of relative clauses

The aforementioned factors entering into the complexity of RCs – depth of embedding, intervention and discourse – have all been addressed in the psycholinguistic literature, but usually from the perspective of comprehension and/or processing. Focusing on child language acquisition, it is generally claimed that production of RCs starts as early as three years of age (Crain, McKee and Emiliani 1990; de Villiers et al. 1994; De Cat 2002 and others), or even earlier, as reported in Håkansson and Hansson (2000), for Swedish, but that ORs are difficult for typical children (see Hamburger and Crain 1979, for elicited production). This observation raised the question of whether it was children's grammar that did not allow ORs or whether it was a performance problem. This general question led to experimental exploration of a number of factors which might be pertinent in explaining order of emergence and frequency in spontaneous language, as we have seen. Goodluck and Tavakolian (1982) argued that the grammar of 4-year-old children includes true relatives, i.e. embedding under DPs. They showed that the tendency to choose the wrong antecedent in comprehension experiments interacts with the animacy of constituents within the relative clause, but that no such interaction occurred if the embedded clause was an infinitival complement. Since the characteristic of RCs is their recursiveness (DPs within DPs), Goodluck and Tavakolian (1982, 2) concluded that children's errors arise when complexity (recursion) "overloads the language processor". In the spirit of this line of enquiry, Corrêa (1995) investigated the comprehension of several types of RCs, corroborating the asymmetry in comprehension of center-embedded to right-branching relatives as well as the

subject-object asymmetry. Kidd et al. (2007) pointed to a strong influence of animacy, specifically of the relative head, in both the frequency of ORs in spontaneous discourse and in the successful repetition of RC sentences, in English and German children. Citing work by Diessel and Tommasello (2005), they also emphasize the possible importance of the fact that early relatives found in spontaneous language of English-speaking children are predominantly found in presentational constructions, illustrated in (7).

(7) This is the sugar that goes in there.

This observation had already been made by Labelle (1990, 1996) for French children on the basis of elicited production data. She proposed that these constructions are in fact not genuine relatives, arguing that they do not involve movement, and claiming that early relatives in French children's productions lack movement. This approach neatly fits into the complexity metric based on movement as proposed by Jakubowicz (2004).² However, it remains highly controversial whether early French relatives involve movement or not (see Guasti & Shlonsky 1995; Guasti & Cardinaletti 2003).

Questions about complexity of structure, availability of movement, and, additionally, theta-role assignment in non-canonical structures have likewise been pursued in research on atypical development (notably, children with Specific Language Impairment, and children with hearing loss). The results complement and corroborate results about typical development, and often allow the isolation of particular complexity factors (for work on relatives, see Delage 2008; Friedmann and Novogrodsky 2004; Friedmann and Szterman 2006; Håkansson and Hansson 2000; Novogrodsky and Friedmann 2006; Stavrakaki 2001; Tuller et al. 2012).

We will argue, on the basis of our analysis of RCs in French, that movement is not the only relevant factor for earliness or frequency of occurrence. Other factors like depth of embedding and the nature of the interveners seem to be more likely candidates for increasing complexity and thus processing load. In other words, we will in fact be pursuing the line of investigation initiated by Goodluck and Tavakolian (1982), in that DP recursion, which they highlight, is fundamentally about depth of embedding. Summarizing, the important factors highlighted in studies of typical and atypical child acquisition of RCs correspond to the components of syntactic complexity described here: depth of embedding, movement/intervention, and information structure. These studies share the following premise: complexity of linguistic computation provides an explanation for the order of emergence and the frequency of production of different syntactic constructions in children.

1.4. Aim and structure of the article

The aim of this article is to contribute to theoretical discussion on syntactic complexity. In particular, we will propose a unified analysis of superficial RCs in French, which argues, on syntactic grounds, that these have a comparatively flat structure compared to genuine RCs, which show classical recursion. In the course of this demonstration, we will also make explicit what the syntactic properties are that render these structures flatter. The specific syntactic analysis we propose takes into account associated discourse effects, in the spirit of Belletti (2008). We will put forward empirical support for the idea that depth of embedding

² Jakubowicz's Derivational Complexity Metric (DCM) (Jakubowicz 2004, 2005) is given in (i):

- (i) a. Merging α_i n times gives rise to a less complex derivation than merging α_i $(n + 1)$ times.
- b. Merge of α gives rise to a less complex derivation than Merge of $\alpha + \beta$.

is a decisive factor in complexity in the development of French RCs, both genuine and “flat,” in typically developing children of various ages and children with specific language impairment. We will follow here the strategy of using child language acquisition, typical and atypical, as a potential source of evidence in support for characterization of syntactic complexity, with atypical acquisition providing sharper insight into these questions due to how highly affected by this property these children are, even at advanced ages. In line with considerable work in the field, we will take appropriately calculated frequency of occurrence and order of acquisition in spontaneous language production to be manifestations of the effects of syntactic complexity.

Frequency and avoidance in spontaneous speech are counterparts of each other in the sense that infrequent use of some constructions is interpreted to be a reflection of these constructions being avoided, causing other constructions to be more frequent. This view of economy would seem to involve a “look-ahead” problem. This potential problem is not specifically related to production. We assume here that just as the parser develops preferences in comprehension (for example, attachment preferences, as proposed in Grillo 2012), in production, strategies develop for ease of processing, leading to avoidance and more frequent production of preferred structures.³

Summarizing, our premise is that syntactic complexity explains order of emergence and frequency of occurrence in language acquisition. Our hypothesis is that depth of embedding is an essential ingredient in the calculation of syntactic complexity. We offer an analysis – on purely syntactic and semantic grounds – of various superficial relative constructions in French which distinguishes them in terms of depth of embedding. We then present evidence from child language which shows that frequency, order of acquisition and avoidance/preference are sensitive to depth of embedding. Our conclusion is that these data provide support for the syntactic analysis we propose and for the hypothesis that depth of embedding is a relevant factor in linguistic complexity. It will furthermore emerge that the type of methodology used offers a relevant complement to experimental evidence, in that information structure effects are naturally controlled for.

Section 2.1 reviews the syntactic and discursive properties of French RCs, introducing the notion that these can be divided into genuine and superficial relatives. Section 2.2 reviews analyses which have been proposed to account for the syntactic and discourse properties of clefts and presentational constructions (contrastive clefts, *avoir* ‘have’-clefts, *il y a* ‘there is/are’ presentationals), which will collectively be referred to as superficial relatives, in that they superficially resemble RCs. In Section 2.3, we propose to unify these analyses in a way that brings out their fundamental hierarchical similarity. Section 2.4 summarizes the findings on the acquisition of genuine and superficial relatives in French. Supporting evidence for this analysis of superficial relatives, which we claim to be flatter and thus less complex than genuine relatives, is put forward in section 3 and comes from investigation of spontaneous productions of typically developing French children and French children with SLI. Finally, section 4 discusses the findings and interprets them in light of our syntactic analysis, and the hypothesis that depth of embedding plays a crucial role in the determination of linguistic complexity.

³ Evidence for such development of preferences of this type can be seen in a trend observed in children and adolescents with SLI. Hamann et al. (2007) found that adolescents with SLI do not produce embedded clauses more frequently than children with SLI (contrary to what is observed in TD children and adolescents), yet they do produce over-all fewer errors. See also Tuller et al. (2012).

2. The Syntax of Superficial Relatives in French

2.1. Types of relative clauses

RCs in French display the typical operator-gap dependency, illustrated in (8a) with an adjunct relative (AR). Subject (8b) and object (8c) relatives are morphologically distinguished via the form of the (obligatory) relative pronoun, which is classically analyzed (Kayne 1975; Pesetsky 1982; Rizzi 1982) as SPEC-head agreement of the complementizer *que* ‘that’ which is realized as *qui* in the case of subject extraction:

- (8) a. le café où j’ai vu Max
the café where I have seen Max
‘The café where I saw Max’
b. la femme qui connaît Max
the woman QUI knows Max
‘The woman who knows Max’
c. la femme que Max connaît
the woman QUE Max knows
‘The woman that Max knows’

French also has a variety of what are variously termed “pseudo-relatives,”⁴ “apparent subordinate relatives,” “superficial relatives,” etc. On the one hand, these constructions resemble RCs in that they contain a clause headed by a relative pronoun linked to a gap which refers to a DP head to the immediate left of the clause. On the other hand, there are compelling reasons for not assimilating these constructions to RCs, in terms of their interpretation, their syntax, and even their prosody. Among these are various cleft constructions (introduced by *c’est* ‘it/that’s’), illustrated in (9a-b), various presentational constructions (introduced by *c’est*, *(il) y a* ‘there is/are’, and *avoir* ‘have’), illustrated in (9c-e), as well as complements of perception verbs.

- (9) a. C’est Max que Léa a vu (pas Pierre) [contrastive cleft]
that’s Max that Lea has seen not Lea
‘Lea saw Max (not Pierre)’
b. C’est Max qui est venu [presentational cleft— focus on DP]
that’s Max that is come
‘Max came’ [answer to ‘Who came?’]
c. C’est le petit qui est tombé dans l’escalier [presentational cleft—focus on event]
that’s the little that is fallen in the stair
‘The kid fell down the stairs’ [answer to ‘What happened?’]
d. Y a Jean qu’ a téléphoné [presentational *(il) y a*]
there has Jean that has phoned
‘John called’
e. Elle a son père qui est malade [presentational *avoir*]
she has her father who is sick

⁴ In recent generative literature the term “pseudo-relatives” is reserved for structures involving perception verbs (*J’ai vu Marie qui courrait* – I saw Marie who ran – I saw Marie run – I saw Marie running), whereas it is used more liberally by other authors. In order to avoid confusion with the more specific use and contrary to the use in earlier versions of this article, we opt for the term “superficial relatives.”

'Her father's sick'

These structures in French have been studied in different grammatical traditions, which have revealed pertinent discourse and syntactic properties. We propose to first of all review these properties here, but also to present data on them from acquisition studies. We will then take up the question of explicit syntactic analyses attempting to account for these properties in the following section (Section 3).

Lambrecht (1988), pursuing observations made by Blanche-Benveniste (1983) on "pseudo-subordinates" (and notably on "apparent" or "false" relatives) in spoken French, presents arguments that superficial relatives introduced by the verb *avoir* 'have' entail neither the syntax nor the semantics of restrictive RCs. This construction, which he refers to as the "presentational cleft" or "*avoir-cleft*" construction consists of superficial relatives introduced by the existential (*il y a*), as in (9d) and (10a), and those introduced by a 'possessive' *avoir*, as in (9e) and (10b).

- (10) a. Y a le téléphone qui sonne !
 there-has the phone that rings
 'The phone's ringing'
 b. J'ai les yeux qui m'font mal.
 I-have the eyes that me-DAT-do bad
 'My eyes hurt'
- (Lambrecht 1988, 136-7)

Noting that corresponding sentences with a monoclausal SVO order (*Jean a téléphoné, Le téléphone sonne, Les yeux m'font mal*) are not felicitous in most discourse contexts in spoken French, because of a constraint entailing that subjects cannot be focused,⁵ Lambrecht shows that *avoir-clefts* are used either to introduce new discourse referents or for 'event-reporting', both of which involve presentational focus, of a DP, as in (9d) or of an event, as in (10a, b). The superficial RC introduced by *avoir* is argued to differ from restrictive relatives in several ways. It does not function as a modifier of the preceding DP, as is evidenced by the fact that this 'antecedent' can be a proper name. It is not presupposed, but rather its predicate corresponds to the main assertion of the sentence. Lambrecht argues that it is non-compositional, and thus there is no felicitous sentence corresponding to (10b) like *j'ai les yeux* 'I have the/my eyes'. In other words, the semantics are that of an event. He suggests that tense-marking in *avoir* presentationals provides an additional argument for the non-compositionality of these constructions. As Blanche-Benveniste also pointed out, *avoir* 'have' is either "frozen" in the present tense, as in (11a), or is dependent on the tense of the superficial relative, as in (11b), where the brother-in-law in question is not presumed to be deceased:

- (11) a. il y a la tante qu'elle demandait des nouvelles
 there has the aunt that she asked some news
 'My aunt would ask for news'
 b. j'ai eu mon beau-frère qui a fait un eh Paris-Nice
 I have had my brother-in-law who has done a uh Paris-Nice
 'My brother-in-law did a uh Paris-Nice'

⁵ See also Zubizarreta (1998).

Lambrecht takes all of these facts to confirm the observation that the superficial relative in these constructions is “not ‘subordinate’ in any clear sense, but expresses the main predication of the two-clause sequence” (Lambrecht 1988, 158).

Blanche-Benveniste (1983), in addition to discussing this special use of *avoir*, distinguishes two uses of *c’est* ‘it/that is’. One is a marker of contrastive focus (see (12a)), which cannot alternate with a full deictic subject plus copula (**Cela est à lui que je pense* ‘That’s him that I’m thinking of’), and which she thus considers not to have the status of a matrix verb. The other, illustrated in (12b), she argues, is a true matrix verb in a presentational construction, as the subject *c’* ‘that’ can alternate with deictics (*cela* ‘that’ and *ceci* ‘this’).⁶

- (12) a. *c’est à lui que je pense*
 it’s to him that I think
 ‘I’m thinking of him’ / ‘It’s him I’m thinking of’
 b. *c’est le chocolat que je voulais (= ceci est le chocolat que je voulais)*
 that’s the chocolate that I wanted (that right there is the chocolate that I wanted)

Again, her conclusion is that in (12a), as in the special *avoir* constructions, an analysis taking the superficial relative clause to be subordinate to a clause headed by the verb *être* ‘be’ would be ill-founded.

2.2. Analyses of clefts and presentational constructions in French

The properties of French clefts and presentational constructions, pointed out by authors such as Lambrecht and Blanche-Benveniste, have been complemented and analyzed formally. We present in turn previous analyses of contrastive/corrective clefts (section 2.2.1), *avoir*-clefts, *il y a* constructions (section 2.2.2), and contrastive clefts versus new information clefts (2.2.3). As we will see, these analyses tend to be focused on a particular subset of these constructions (clefts or *y a*).

2.2.1. Contrastive/corrective clefts

Clech-Darbon & al. (1999) present both syntactic and prosodic evidence that contrastive focus clefts do not have the syntax of restrictive RCs. They argue for an analysis in which the superficial RC is in fact a CP which is right-adjoined to an identificational IP, as illustrated in (13):

- (13) A: *Ta fille est tombée dans l’escalier?*
 ‘Your daughter fell down the stairs?’
 B: *Non. [IP [IP c’est le petit] [CP qui est tombé dans l’escalier]]*
 ‘No. It’s the little boy who fell down the stairs’

This analysis (see also De Cat 2002) captures the basic insight that various superficial RCs do not function as restrictive RCs (intonationally or semantically) and therefore do not have their syntax either. In particular, they do not involve embedding inside a DP.

⁶ See also Kayne and Pollock (2009).

2.2.2. *Avoir-clefts and il y a constructions*

A construction which also involves an apparent DP containing an embedded clause is that of complements to perception verbs analyzed by Cinque (1992) and others as being in fact propositional with a DP followed by a gerund clause. In his analysis of these, Cinque (1992) points out that the motivation for a propositional analysis is found in several other constructions as well. Among these constructions, interestingly (and based on Moro 1989), small clauses in existential contexts are also listed, illustrated in (14). This type of analysis, thus, converges with Blanche-Benveniste's and Lambrecht's observations about presentational *avoir-clefts* with *il y a* in French, see (15).

(14) There is somebody climbing the stairs

(15) Y a Jean qu'a téléphoné
there is John that has telephoned

The same analysis, involving a small clause (SC), is explicitly proposed by Côté (1999), on the basis of data from Quebec French, see (16); Côté notes that the relevant properties hold for spoken French in general, citing Lambrecht (1988), among others. Côté argues that the small clause analysis of existential RCs that have an event-reading accounts not only for their interpretation, but also for the fact that this reading is available only if the DP following the existential corresponds to the subject of the embedded predicate as in (17b).

(16) y a [_{CP(SC)} Jean [_{CP} qui <Jean> est venu]]⁷
there is John who is come

- (17) a. Qu'est-ce qui s'est passé ?
'What happened?'
b. Y a Jean qui est venu
'John came'
c. *Y a Jean que j'ai appelé
'I called John'

These facts follow, she argues, because the small clause analysis of such complements, following Haïk (1985), Cinque (1992), Guasti (1994), entails that the DP, as subject of the SC, is an A-position, and therefore that movement to this position is A-movement. This means that movement of a non-subject is prevented by Relativized Minimality (Rizzi 1990) or Minimal Configuration (Rizzi 2004), because this movement would encounter the subject of the CP predicate, which is also an A-position with argumental features, and thus constitutes an intervener, blocking A-movement of the object as shown in (18):

(18) Y a [_{CP(SC)} Jean [_{CP} que j'ai appelé <Jean>]] [= (17c)]
X Z Y



⁷ Côté also entertains an analysis à la Guasti (1994), in which the subject of the small clause is base-generated and there is a *pro* in the subject position of the predicate CP.

The subject-object asymmetry noted by Blanche-Benveniste and by Lambrecht is thus accounted for, as is Lambrecht's observation that the apparent object of *avoir* in these constructions is really a semantic subject. In the Côté analysis, the DP following *y a* is indeed a subject-of the propositional complement to *y a*. The apparent object status stems only from the fact that this DP is a small clause subject, and thus is case-marked from outside, by *avoir*. Côté notes that her analysis applies to other constructions in Quebec French: presentational clefts (*C'est Marie qui est venue - pas Jean qui a appelé* 'It's that Marie came - not that John called'), deictic constructions (*V'là Jean qui arrive* 'Here's Jean arriving'), and possessive constructions (*J'ai l'auto qui est en panne* 'I've got a car that's broken down'), all of which display the same subject-object asymmetry, all of which are restricted to stage-level predicates, and all of which are also discussed by Blanche-Benveniste and by Lambrecht, for spoken French.

Summarizing, in *c'est* cleft constructions, as analyzed by Clech-Darbon et al. (1999) and by Côté (1998), who extends the analysis to *y a*, we find a small clause CP containing another CP as a predicate. As predicates, notice that such CPs are not embedded within a DP, making them fundamentally different from genuine relative clauses.⁸

2.2.3. Contrastive clefts vs. new information clefts

Belletti (2008, 2009, 2015) proposed an analysis of cleft constructions, with specific reference to French, which, in fact, derives syntactically the important observations about information structure made by Blanche-Benveniste and by Lambrecht (see Section 2.1 above). Her analysis distinguished new information clefts, which, as we have seen, are restricted to subjects, from contrastive focus clefts (which are not restricted to subjects). She argued that these correspond to two separate focus positions – a higher position, which is in the left periphery of the sentence, and corresponds to contrastive focus, and a lower position, which is in the topic-focus field just above vP.

Contrastive focus clefts are taken to involve a CP complement to the copula and movement of the focused constituent to the left-peripheral SPEC, FocP position. Since CP complements to the copula are not declarative CPs, but rather are predicates, Belletti (2013 and to appear/2014) reasoned that their C does not express Force and thus does not occur in the left-most periphery of CP, but rather in a low position, to the right of the FocP as illustrated in (19a,b).

- (19) a. être [CP [FocP Marie [que Jean a embrassé <Marie>]]] [contrastive focus of object]
 be that has kissed
 b. être [CP [FocP Marie [qui <Marie> a parlé à Jean]]] [contrastive focus of subject]
 be who has spoken to

Belletti points out that Relativized Minimality is not violated in (23a), since, although movement has crossed the subject position, this movement of the object is to an A'-position which hosts operator features, whereas the subject occupies an A-position. Notice also that in the structure argued for by Belletti, as in the Clech-Darbon & Rebuschi proposal presented above, the CP cannot be a modifier of the DP, since it is not embedded inside of DP.

⁸ Very recently, *il y a* constructions have come to the notice of linguistic research; see Karssenbergh & Lahousse (2015), who still call this construction "under-researched".

superficial relative seems particularly appropriate for these structures without DP (or CP) recursion.

The structure proposed by Belletti (2008, 2009) has the additional advantage of providing structural representation for the discourse properties observed by Lambrecht and others. We will therefore adopt significant aspects of this analysis, adapting it to take into account Côté's analysis of existential relatives.

2.3. A syntactic analysis of *c'est* and *il y a* superficial relatives

Building on our previous work, we will propose an analysis in which various types of apparent relatives which appear as complements to *c'est* or *avoir* in fact involve not a DP complement which contains a CP (the structure of a genuine relative clause) but rather a CP complement. While complements to 'be' in French can entail either contrastive or presentational focus, and thus, adopting Belletti's analysis, can involve either the high or the low focus position, focus constructions with 'have' entail only presentational focus, and, thus should only involve the low focus position. In other words, 'have' selects either a DP or a small clause complement.

A genuine RC (a restrictive relative) can occur in a construction with 'have' when it is embedded inside the DP complement of 'have', as in (24a-b). In these cases, it is the entire DP which moves to the low focus position.

- (24) a. [Max a [_{DP} un frère [_{CP} que Marie ne supporte pas]] [genuine RC]
 'Max has a brother that Mary can't stand'
 b. Il y a [_{DP} un yaourt [_{CP} que Max a acheté hier]] [genuine RC]
 'There's a yoghurt that Max bought yesterday'

When a small clause complement is selected by *avoir*, it is the event that has new information focus, and thus it is the entire CP small clause, which moves to the low focus position.¹² These constructions do not contain genuine RCs, but rather CP predicates of a small clause, illustrated in (25).

- (25) a. y a [_{CP (sc)} Jean [_{CP} qui <Jean> est venu]] [superficial rel]
 'There's John who came'
 b. j'ai [_{CP (sc)} ma voiture [_{CP} qui <ma voiture> est au garage]] [superficial rel]
 'I have my car that's in the garage'

These superficial relatives are restricted to SRs, because of the interaction between the small clause analysis and Relativized Minimality, as we have seen, while genuine relatives are not restricted in this way, as they involve A'-movement only.

Returning to complements of 'be', we adopt essentially Belletti's (2008, 2009) analysis in which the copula selects for either a full CP complement or a small clause CP. In the first case, any constituent of the full CP complement may move up to the left peripheral

¹² (*Il y a*) appears to also select for a regular CP complement, see (i). These presumably are to be analyzed as reduced small clauses as in (ii):

- (i) Il y a que le petit qui est tombé dans l'escalier
 (ii) Il y a [_{CP (sc)} [que le petit est tombé dans l'escalier] (qui se passe)]
 (Literally: There is that the boy fell in the stairs that's happening)

contrastive focus position, (26). In the second case, the subject of the CP small clause complement necessarily corresponds to the subject of the CP predicate (again, because of Relativized Minimality). This subject may then move to the lower focus position, (27).

- (26) $c' \dots est$ [_{CP} ... [_{FocP} Max ... que [_{TP} j'ai vu <Max>]]] (pas Pierre)
 it is Max that I have seen not Pierre
 [superficial rel, contrastive focus]

- (27) [_{TP} $c'est$... [_{FocP} Jean ... [_{VP} [_{CP} [_{sc}] [_{DP} <Jean> [_{CP} qui <Jean> a parlé]]]]]]]
 it is John who has spoken
 [superficial rel, new information focus]

Rialland et al. (2002) show that cases like (26) must be distinguished both semantically and prosodically from focus constructions involving *c'est* and an RC in which an entire clause is focused, and which are answers to the question 'What's going on?'. They argue that these properties can be derived from a reduced cleft analysis, where there is a truncated predicate *qui se passe* 'that is going on'. Belletti suggests that the RC in these constructions is a genuine restrictive relative inside the subject of the small clause whose predicate is 'that is going on' as in (28).

- (28) $c'est$ [le petit [qui est tombé dans l'escalier]] qui se passe]
 it is the boy who is fallen in the stairs that CL-REF happens

Notice, however, that this analysis means that the subject of *qui se passe* is a DP, which semantically is odd (*The boy is happening). This is because the subject of 'happen/go on' must be an event and clearly a boy is not an event. What is happening is not a boy, but rather that the boy fell down the stairs. If the subject should in fact be an event, we expect to have a clause. We therefore suggest the analysis in (29), in which the subject of this small clause is in fact itself a small clause CP.

- (29) [_{CP}(_{sc}) [_{CP}(_{sc}) [_{DP} le petit] [qui <le petit> est tombé dans l'escalier]] ([qui se passe])
 the small who is fallen in the stairs that CL-REF happens

It is then the lower small clause, the subject of 'is happening', which moves to the focus position. Recall that the subject of this lower small clause has been moved out of its CP small clause predicate.¹³ This predicts that these constructions also display the subject-object asymmetry typical of new information focus, which is correct, as shown in (30a-d). If the RC is a restrictive relative embedded within the subject DP, as Belletti (2008) suggested, then (34d) is wrongly predicted to be grammatical. We will therefore assume the structure in (29), which gives rise to movement of the CP(SC) subject *le petit qui est tombé dans l'escalier* to the low focus position, correctly representing the fact that focus is on the event.

- (30) a. Qu'est-ce qui se passe ? 'What's happening ?'
 b. Léa a vu Max dans l'escalier 'Lea saw Max in the stairs'

¹³ We are aware that the analysis may involve more complex mechanisms in order to overcome Criterial Freezing (Rizzi 2006) and allow movement to the edge of a phase.

- c. C'est Léa qui a vu Max dans l'escalier 'It's Lea who saw Max in the stairs'
- d. *C'est Max que Léa a vu dans l'escalier 'It's Max that Lea saw in the stairs'

To summarize, we have distinguished genuine relatives, RCs which are modifiers restricting their antecedent, from superficial relatives, a term we are using in a very general sense to indicate CPs which are deceptively similar to RCs, but involve predication and thus, syntactically, are not embedded within a DP. The crucial difference, we have argued, is the depth of embedding of the subordinate small clause CP.

- (31) a. Genuine relatives (CP inside DP, inside IP)
- b. Contrastive clefts (XP in left-peripheral focus position, not inside a DP)
- c. Presentational focus (DP/small clause CP in low focus position, not inside a DP)

In superficial relatives, both contrastive focus and presentational focus, the CP is a small clause and, crucially, is not inside the DP, at any point in the derivation. In genuine relatives, on the other hand, the CP is a modifier of the head of the relative clause, and as such, is merged inside the DP.

Thus, RCs are not differentiated by the presence or absence of *wh*-movement. Rather, they can be distinguished by the presence of an intervener to that movement (as argued by Gibson 1998; Gordon 2001; Friedmann et al. 2009), or by the depth of embedding (see example (28) vs. the examples (29)-(33) and the summary in (35)). In this light, the fact that clefts and other presentational constructions involve movement to a focus position does not make them as complex as genuine RCs. They are in fact less complex precisely because they involve a predicational, less deeply embedded CP, in the sense that it is not embedded in a DP. Notice also that this analysis means that contrastive focus clefts are very much like presentational clefts in terms of depth of embedding of the CP. Their difference lies in whether the DP is the small clause subject of a predicate CP, the case of presentational focus, or not, the case of contrastive focus. However, we do expect that object (contrastive focus) clefts might be sensitive to intervention effects, which separates them from subject clefts, contrastive or presentational (see in particular the findings of Gordon et al. 2001). This is because contrastive focus entails a configuration which is reminiscent of the one investigated by Friedmann et al. (2009) for object relatives, and which is potentially subject to relativized minimality effects.

2.4. The acquisition of relatives in French

Many authors have reported that superficial relatives are produced very early on by children acquiring French, appearing prior to genuine RCs. Labelle (1989, 1990) found that superficial relatives (and specifically contrastive focus clefts and presentational *c'est* constructions) were mastered earlier than RCs in a study of elicited production to 3- to 6-year-olds, and she also cites other work arriving at the same conclusion on the basis of spontaneous production data (see, for example, Rondal 1979). De Cat's (2002) longitudinal spontaneous language study of four young French-speaking children (2 Belgian, 1 Canadian, and 1 French) found that attempts at clefts (for example, *non, c'est moi [qui l'ai] le pingouin* 'No, I'm the one (who has) the penguin', De Cat 2002, 265) occurred before the first embedded finite clauses, and that these latter were (subject) clefts, generally with complementizer omission (*c'est Mamy [qui l'] a mangé* 'It's Mamy (who) has eaten (it)').

Jisa & Kern's (1998) study of relative constructions in Frog story narratives also found that children learning French favor certain types of relative(-like) structures, long into

childhood. Comparing 5-year-olds, 7-year-olds, and 10-year-olds to adults, and looking at both internal structure and narrative function of RCs, they observed that the children of these three age groups generally performed similarly and differently from the adults. The proportion of SRs compared to non-SRs among children remained at 90% or higher, compared to 79% in adults; only adults had more than a negligible proportion of center-embedded relatives; children used about twice as many intransitive relative constructions as transitive ones, whereas transitivity was equally distributed in adults' relative constructions. Children's RCs displayed frequent use of presentational constructions (with *il y a* or with *c'est*), and thus they performed well on the discourse function of introducing new referents. However, their preference for structurally simpler RCs (intransitive), it is argued, was also responsible for their infrequent use of RCs with narrative advancing functions (as transitivity in the RC is crucial for advancing the story plot – a transitive RC promotes a new referent, but also sets an agent-patient relationship between the new referent and the other story participants). Protracted development of the internal complexity of RCs thus was taken to influence narrative development.

Gayraud & Martinie (2004) studied the development of the complexity of French RCs in older children (9-, 12-, and 15-year-olds), compared to adults, in spoken and written narratives. They found that, in the spoken narratives, the proportion of what they refer to as “segmented” RCs (clefts, pseudo-clefts, and presentational (*il y a* and presentational *avoir*) compared to other RCs decreased with age to a very significant degree (65% in 9-year-olds, 34% in 12-year-olds, and around 25% in 15-year-olds and in adults), and these were also significantly more prevalent than other relatives in oral narratives compared to written narratives (except for the youngest children, who used high proportions of “segmented” relatives in both modes). These results mirror the developmental progression found in younger children, though Gayraud & Martinie propose that superficial relatives (their “segmented” relatives) are the most complex (for reasons they do not make clear). This is problematic (as they point out), as these constructions are precisely those which are frequent in younger speakers; their suggestion is that this high frequency is an example of a complex structure having been schematized.

Contrary to Gayraud & Martinie, Hamann et al. (2007), Delage et al. (2008), and Tuller et al. (2012) have argued that order of emergence and relative frequency in younger speakers are in fact directly linked to the complexity of the syntax. Thus the early and frequent occurrence of presentational *y a* and *avoir* constructions is explained by the idea that some apparent RCs in fact involve simpler syntax. This work has also found that younger typically-developing children, as well as children acquiring French in atypical contexts (SLI, hearing loss, and childhood epilepsy) show clear signs of preference for SRs over non-SRs, and that clefts, presentational *c'est / y a*, and RCs used without a root clause (0-level relatives) occur frequently. The studies by Hamann, Tuller and colleagues showed that the bulk of the relatives produced by a group of TD 6-year-olds and by a group of children with SLI were of the following type: 0-level, left dislocation, presentational *y a*, and *c'est* constructions. They suggested that the generalization underlying these more frequent constructions was that contrary to genuine relatives, which involve the embedding of a CP within a DP within an IP,¹⁴ in each of these other constructions one of these layers is missing, IP or DP. In the preceding section, a syntactic analysis has been developed on

¹⁴ Note that a formulation as “a CP within a DP within a vP” would exclude relative clauses with head nouns that are constituents of adjuncts such as *John plays tennis on a court that has never been raked*. The crucial property we aim to capture here is that the modified DP is a constituent of a clause, minimally an IP.

theoretical grounds, providing a unified analysis in particular for *il y a* and *c'est* constructions and thus a foundation for the intuition that superficial relatives, as a group that includes *il y a* constructions, are simpler than genuine relatives. This analysis constitutes an explanation for previous results. In the cited previous studies, all superficial relatives were compared to all genuine relatives. However, given what is known about the effects of intervention in non-SRs clauses, the role of depth of embedding can be ascertained only if these effects can be controlled for. We will report on results of a study which explores in greater depth the ways in which the different syntactic properties of superficial relatives and genuine relatives have an effect on their occurrence in early child production and in the production of children with SLI.

3. Supporting Evidence from (A)typical Child Spontaneous Production Data

The view of relativization in French that we are advocating here draws thus on a large body of empirical and analytical work suggesting that so-called RCs are not equally complex, in terms of the level of embedding that their syntax entails. We offer support for this syntactic analysis from our own results on child spontaneous production data, some of which have appeared (Delage et al. 2008; Tuller et al. 2012) and some of which are new. This research program has sought to examine (inter alia) whether the factor of depth of embedding plays a role in determining what kinds of RCs are predominant in young children compared to older children, and whether an even sharper pattern can be detected in production of children with SLI. This program is pursued in the present data analysis.

After looking at the over-all frequency of RCs produced by TD children and children with SLI, we present results about avoidance strategies and errors, and evidence for the subject-direct object asymmetry, manifested in terms of relative frequency of types of RCs (all kinds, genuine and superficial relatives). We broaden the SR-OR dissociation to include adjunct relative (AR) clauses, which we suggest should behave like ORs under the Friedmann et al. (2009) analysis of intervention as an RM effect (since in both cases there is a potential intervener in the subject position).

Once these basic properties of RCs have been reported on, we turn to evidence for the relevance of depth of embedding. Simply determining level of embedding with respect to the matrix clause is a first indication of production sensitivity to depth of embedding. Do younger children and children with SLI produce a greater proportion of the lowest level of embedding (0-level)? The flatter structure argued for in contrastive focus clefts and presentational constructions also means that the proportion of these in spontaneous production should decrease with age in TD development, in accordance with the finding that they are the first relatives to appear (Labelle 1990, 1996; De Cat 2002), that they have been found to decrease in TD children after age 9 (Gayraud & Martinie 2004), and that they have been observed to predominate among RCs in children with SLI (Delage et al. 2008). We propose to control for possible cumulative effects of both intervention and depth of embedding by alternatively looking at constructions in which depth of embedding is the same, comparing SRs to non-SRs, and then only at SR constructions, genuine and superficial relatives, for which intervention does not play a role.

3.1. Method

We studied spontaneous language samples taken from five groups of monolingual French-speaking children: typically developing six-year-olds (TD6), eight-year-olds (TD8),

eleven-year-olds (TD11), and fourteen-year-olds (TD14),¹⁵ and a group of ten- to twelve-year-old children with SLI (SLI 10-12) not previously reported on. The children with SLI were all recruited at the same university teaching hospital language reference center, on the basis of a diagnosis for expressive SLI (all subjects had Performance IQs of 85 or greater).

Group	Mean Age	Sex	Age Range	MLU (SD)
TD6 (N = 12)	6;4	7 M 5 F	6;1 - 6;7	6.97 (.88)
TD8 (N = 12)	8;2	6 M 6 F	7;9 - 8;7	7.59 (1.28)
TD11 (N = 12)	11;4	6 M 6 F	11;1 - 11;9	7.90 (.83)
TD14 (N = 12)	14;5	6 M 6 F	13;7 - 14;10	8.22 (.99)
SLI 10-12 (N = 16)	11;7	11 M 5 F	10;1 - 12;10	6.38 (.77)

Table 1. Characteristics of TD Groups and SLI Group

The four TD groups, which range in age from 6 to 14, allowed us to look at developmental trends over a broad age-range, an important source of evidence since we are hypothesizing that frequency of complex RCs increases with age, well after childhood and into adolescence. In addition, the TD6 group served as a rough language-match for the children with SLI, and the TD11 group served as an age-match. The mean MLU for the SLI 10-12 did not differ significantly from the TD6 group ($U = 60$; $p = .094$), while it was significantly lower not only than that of their age controls, the TD 11-year-olds ($U = 10$; $p < .01$), but also than that of the TD 8-year-olds ($U = 39.5$; $p < .01$).¹⁶

Spontaneous language samples were collected via fifteen minute digital audio recordings of conversation with a student investigator, which followed an identical protocol. Participants were first requested to provide a story for a series of drawings and then questioned about their interpretation of the drawings. A free conversation followed in which the investigator asked about school and extra-curricular activities and asked the participant to tell the story of a book/video game/movie/television show that they knew well. Transcription, which began at minute five of the recording, to make sure the child felt comfortable with the situation, continued until the sample contained 60 to 70 utterances produced by the subject (yes/no answers and repetitions were excluded).

RCs were coded by type (subject, object, adjunct, as in (32)), but also so that the role of depth of embedding could be assessed. Embedding was coded for level: 0-level corresponding to an RC occurring in an utterance with no matrix clause, level-1

¹⁵ See also Monjauze (2007), Delage (2008), Delage et al. (2008), Tuller et al. (2012) for other analyses of the language samples from these TD groups, in comparison with different atypical populations (SLI, mild-to-moderate hearing loss, and Rolandic Epilepsy). These analyses did not include the in-depth analyses of relative clauses of the type proposed here.

¹⁶ It can also be seen that MLU increases with age in the TD groups; these differences are significant only between TD6 and TD11 ($U = 32.0$; $p < .05$) and between TD6 and TD14 ($U = 25.0$; $p < .05$). This result mirrors those found by other studies of spontaneous language in older children (see Tuller et al. 2012).

corresponding to a embedded in a DP of the matrix clause, level-2 corresponding to an RC embedded in a DP of a clause immediately embedded within the matrix clause. For example, (33a, c) are level-1 adjunct RCs: REL1-A. Likewise, clefts (contrastive and new information) were coded (see CLE as in (33a)), as were relatives introduced by presentational *avoir* or *c'est*, (see PRES in (33b)). Object and adjunct relatives and clefts were further coded for the nature of the RC subject and of the head of the relative clause, in order to control for intervention effects, as illustrated in (33b, c).

- (32) a. j'ai eu le costume de Cendrillon qui est réversible. [REL1-S] (TD6)
 'I got the Cinderella costume that is reversible'
- b. puis après j(e) vais regarder un DVD qu'on m'a prêté [REL1-O] (TD11)
 'then after I'm going to watch a DVD that somebody loaned me'
- c. et son mari est tombé sur son journal intime où elle avait tout marqué [REL1-A] (TD14)
 'and her husband found her diary where she had noted everything'
- (33) a. et puis c'est là qu'elle travaille [REL1-A] [CLE] (TED, SLI)
- b. c'est un garçon que la fille a enfermé [REL1-O][PRES] parce qu'elle a des robots (JUL, SLI)
 Head = animate DP Subject = animate DP
 'It's a boy that the girl locked up because she has robots'
- c. ouais c'est ce qu'il m'a dit [REL1-O] [PRES] (TD14)
 Pn [-an] [headless] [pn]
 'Yep, that's what he told me'

Finally, all sentences were analyzed for errors, as illustrated in (34), an utterance produced by a child with SLI, which contains errors both inside the RC itself and elsewhere in the utterance. Furthermore, all constructions which arguably could have surfaced as an RC were also coded. These included juxtaposition of two root clauses (where one could have been an RC inside the other, see (35a)), as well as utterances containing self-interruptions inside the RC (and thus production of the RC was abandoned, see (35b)), and utterances containing an RC, but in which the matrix clause was missing a verb (see (35c)), and thus embedding was not really complete.

- (34) et elle retrouve quelqu'un qui q... qu'ils [*] se [*] connaissent [*] [REL1-S] bien car il a fait [CIR1] une course contre lui [*] (ROM, SLI)
 'And she met somebody who th.. that they know each other well because he raced against him (=her)'
- (35) a. comment on dit [PR] &euh. Ben 0*y 0*a deux: groupes. Un groupe de &f filles et un groupe de gars. I(ls) vient [*] dans ... &euh avec &euh ... (CHL, SLI)
 'How do you say um. Well (there are) two groups. A group of two girls and a group of guys. They comes in ... um with um...'
- b. et du coup y a une fille qui voudrait [REL1-S] [PRES] de pour euh f ... 'So there's a girl who would like... to.. for.. um f...' (ROM, SLI)
- c. mais *(c'est) un ami du monsieur qu'elle veut [REL1-O] tuer (JUL, SLI)
 'But (he's) a friend of the man that she wants to kill'

3.2. Results and analysis

Analysis of the 64 transcribed and coded spontaneous language files gave rise to a corpus of 395 RCs (of all types). The measures described in the preceding section allowed us to examine depth of embedding as a complexity factor, compared to other complexity factors, as revealed in inter-group relative frequencies. We proceeded in the following manner: first of all, looking at all types of RC's (genuine and superficial, subject, object, and adjunct), which have in common the factor of A'-movement, we measured, for each group of participants, relative frequency, proportion of erroneous RC's, and "active avoidance" of RC's. Next, we compared SR's to OR's and AR's (all types) in each group to ascertain whether Intervention affects frequency. Depth of embedding was then examined, in two ways: first frequencies of levels of embedding of all types of RC's were compared (0-level, level-1, etc.), and, second, frequencies of genuine relatives were compared to frequencies of superficial relatives, since, by hypothesis, the former involve deeper embedding compared to the latter. Finally, we attempted to cross potential intervention effects with depth of embedding effects by looking at the relative frequencies of genuine and superficial relatives only among SR's (where there is no potential intervention), and then examining the proportion of SR/OR+AR only in genuine relatives.

Taking into account all RCs produced, both genuine and superficial and both subject and non-subject, the proportion of subordinate clauses that are RCs was basically the same in each of the groups of participants (about 1/3).¹⁷ Figure 1 shows that the groups are also similar, in fact, for the mean number of RCs produced per child. In the samples studied the differences between the TD groups are not significant, nor is that between the SLI group and each of the TD groups (except for SLI /TD-14 comparison, $U = 46,0$; $p < .05$). This result is a priori surprising if RCs, in the broad sense, are difficult because they involve movement/internal merge. In particular, why do children with SLI appear to have no more difficulty than children their age in producing RCs? This result suggests that the nature of the relatives produced needs to be examined.

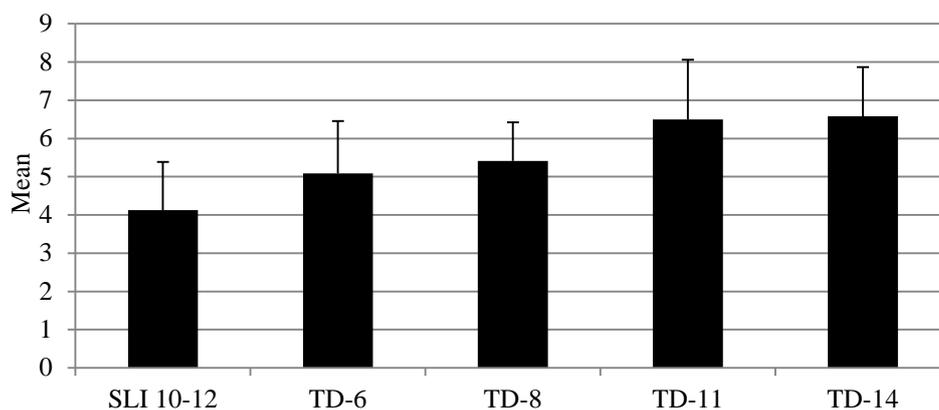


Figure 1. Frequency of all embedded relative clauses (mean N)

¹⁷ The mean % of embedded RCs over total embedded subordinate clauses is 33.9% (20.1) for the SLI 10-12, 32% (16.7) for TD-6, 30.6% (12.6) for the TD-8, 32.3% (11.0) for the TD-11, and 29.7% (8.7) for the TD-14.

We expected that RC production might cause children with language impairment to make errors (either in the RC itself or elsewhere in the sentence), and we also expected that the difficulty involved in the production of RCs might have as a consequence that these children would express the same information by using other, simpler syntactic means, and, finally, we expected that these children might actually show signs of abandoning RCs, for example, through self-interruptions.

On average, over ¼ of utterances (26.6%) containing an RC produced by SLI participants were indeed erroneous. As can be seen in Figure 2, this rate was under 10% in the TD6 (6.2%) and TD8 (9.2%) groups, and amounted to only 1 or 2% in the TD11 (1.2%) and TD14 (2.1%) groups. We see a developmental trend in the TD groups (TD6 and TD8 versus TD11 and TD14), and the SLI group, not surprisingly, was worse than even its language matched group (TD6).¹⁸

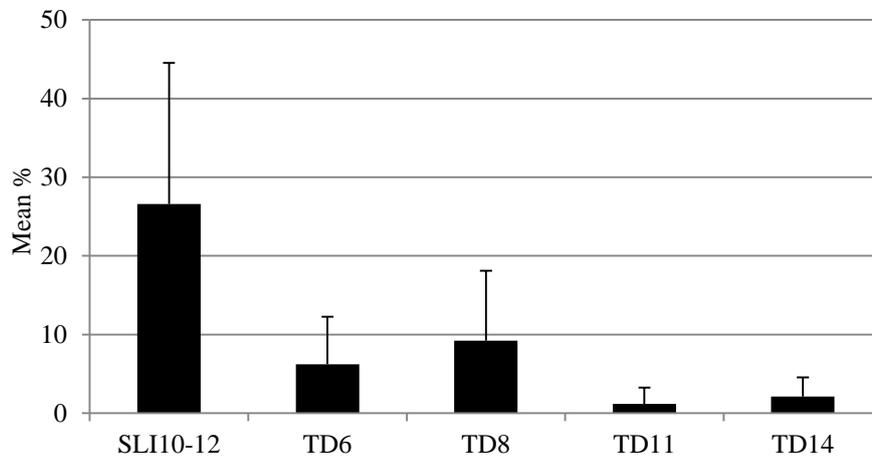


Figure 2. Mean % of RCs occurring in an erroneous utterance

In order to assess “active” avoidance of RCs, we added the total number of RCs produced to the number of ATTEMPTS at RCs, those which did not surface as RCs because either the clause was abandoned via a self-interruption or because two juxtaposed clauses were produced instead. This sum was termed POTENTIAL RCs. Out of this total mean number of potential RCs, we then calculated the mean percentage of attempts. This calculation yielded the fact that nearly 1/4 of the potential RCs in the SLI group were attempts (M 23.5%, SD 19.3), whereas this rate was well below 10% in each of the TD groups (3%, 4%, 6%, and 3%, respectively, for TD6, TD8, TD11, and TD14). A Kruskal

¹⁸ The extremely low error rates in the TD groups did not lend themselves to qualitative analysis. The rarity of genuine RCs and of non-subject RCs in the SLI group makes it impossible to pursue meaningful comparative error analyses. Genuine relatives in the SLI group amounted to only 13 total, and half of the 16 children did not produce a single one, and thus it was impossible to compare errors in genuine relatives to those in superficial relatives, though it was clear that errors occurred on the same elements (affecting complementizers, tense morphemes, number and gender agreement, etc. and consisting of both omissions and substitutions). Likewise, comparing error types between SRs and non-SRs, qualitatively or quantitatively, is very hard to do, because of the small number of non-subject relatives produced in the SLI group (a total of 10 ORs and 8 ARs, and 6 of the 16 children did not produce any non-subject RCs).

Wallis Anova confirmed a significant group effect ($H = 15.9, p < .01$). The rate of attempts at RCs in the SLI 10-12 was significantly higher than that in each of the other groups (TD6 $U = 36.5, p < .01$; TD8 $U = 39.5, p < .05$; TD8 $U = 43.5, p < .05$; TD14 $U = 38.0, p < .05$). Figure 3 presents the proportions of produced RCs, self-interruptions of RCs, and cases of two juxtaposed clauses, the latter two constituting what we are calling attempts.

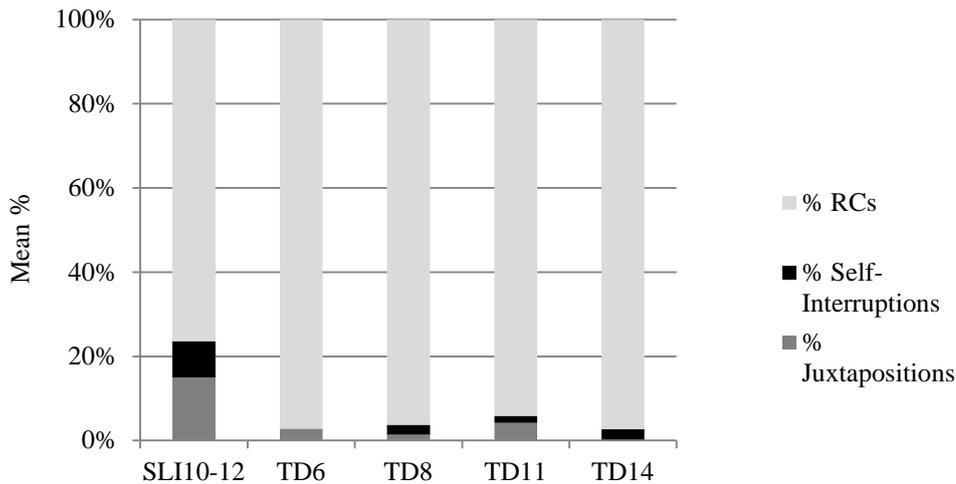


Figure 3. Mean % of RCs, Self-Interruptions of RCs, and Juxtapositions

Examples of attempts at RCs were given in (35) above. The examples in (36) are particularly illustrative of the specific difficulty that embedding poses. (36a) displays first a self-interruption of the RC (She found a black horse that was at...) and then a second pass consisting of juxtaposition of two root clauses (It was a magic horse. She found it). In (36b), we see self-interruption of an RC (After/then there's a, a friend of...the woman...), followed by a 0-level RC in the second pass (The old woman who found him), which is in turn followed by a juxtaposition (She, he knows his first name), avoiding thus production of two RCs dependent on the same head noun (There's a friend of the old woman who found him who knows his first name). Similarly, (36c) displays an (erroneous) utterance consisting of a juxtaposition which gets around production of an RC which would include a level-5 complement clause (For example, that there is one of his best childhood friends he has he is missing because he went to go to see if there weren't any Germans around).

- (36) a. ça raconte. ben ça raconte qu'elle a trouvé un le... Je sais plus comment ça s'appelle. elle a trouvé une un cheval noir qu' était à ... Ca fait un cheval magique Elle l'a trouvé .
'It talks about. It talks about that she found a, the ... I don't know what you call it. She found a a black horse that was ... It was a magic horse. She found it.
(JUL, SLI)
- b. après y en a un... un ami à la dame la vieille dame qui l'avait trouvé bah. elle il sait son prénom.
'after there is a a friend of the lady the old lady who had found him, well.

- She he knows her first name' (MAR, SLI)
- c. par exemple que y a un d(e) son [*] meilleurs copains d'enfance il a il est porté disparu car il est allé faire un tour pour voir si y a pas d'Allemands autour.
 'for example, that there is one of his best friends from childhood he has he is missing because he went to go see if there are any Germans around'
 (ROM, SLI)

As expected, SRs of all kinds, which do not have a potential intervener, are generally more frequent than ORs, as can be seen in Figure 4. We also see that ARs are similar in frequency to ORs, and not to SRs, supporting the idea that intervention effects are not limited to ORs, as we have suggested (but see footnote 24). The mean number of SR is higher than that of non-SRs (OR + AR) (in TD-6, $Z = 2.27$ $p < .05$; in TD-8, $Z = 2.8$ with $p < .01$; in TD-14, $Z = 2.55$, $p < .05$; in SLI, $Z = 2.98$, $p < .01$), except for the TD-11 ($Z = .56$, $p = .575$).¹⁹

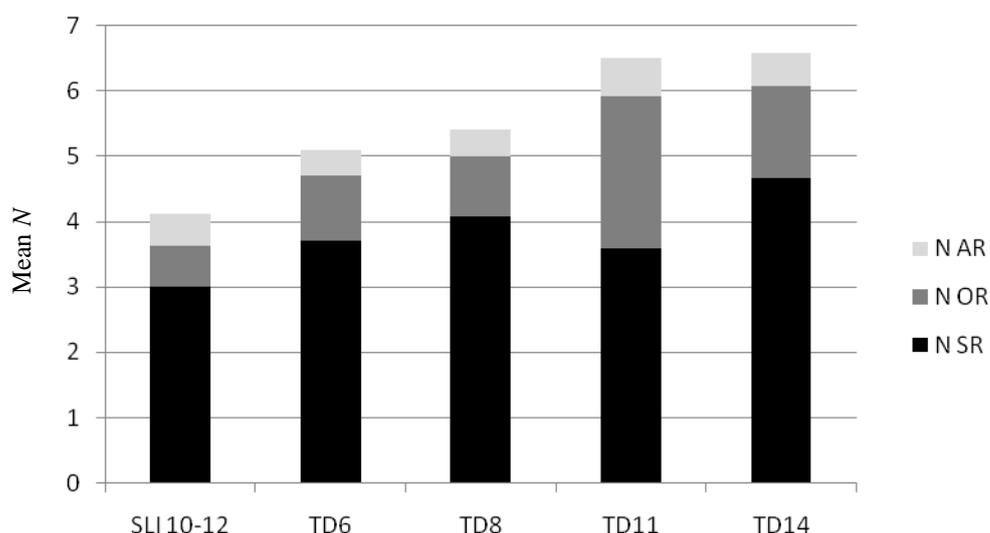


Figure 4. Subject, Object, and Adjunct Relatives (Mean N)

The results reported in the above figures have all concerned general RC production of all kinds. We argued above, on syntactic grounds, that superficial RCs in French in fact can be classified according to depth of embedding. Turning then to results which target specifically the embedding factor, when 0-Level RCs (RCs not embedded within an IP) are compared to embedded RCs (Level-1, Level-2, etc.), as in Figure 5, it was found that participants with SLI produced a larger proportion of 0-Level RCs (23%), significantly more than each of the TD groups.

¹⁹ Regarding the SR/OR asymmetry, it is important to note that no evidence was found that ORs are avoided through use of subject relatives with a passive or a reflexive causative (*se-faire*) construction, contrary to what has been found in elicited production experiments (Manetti and Belletti 2015; Belletti and Contemori 2010; Delage 2008). Such constructions were not found at all in the samples from the SLI, the TD6 and the TD8, and only one token each was found in the TD11 and the TD14 samples. We argue elsewhere (Hamann and Tuller 2015) that the discourse situation in elicited production of object relative clauses favors production of a passive.

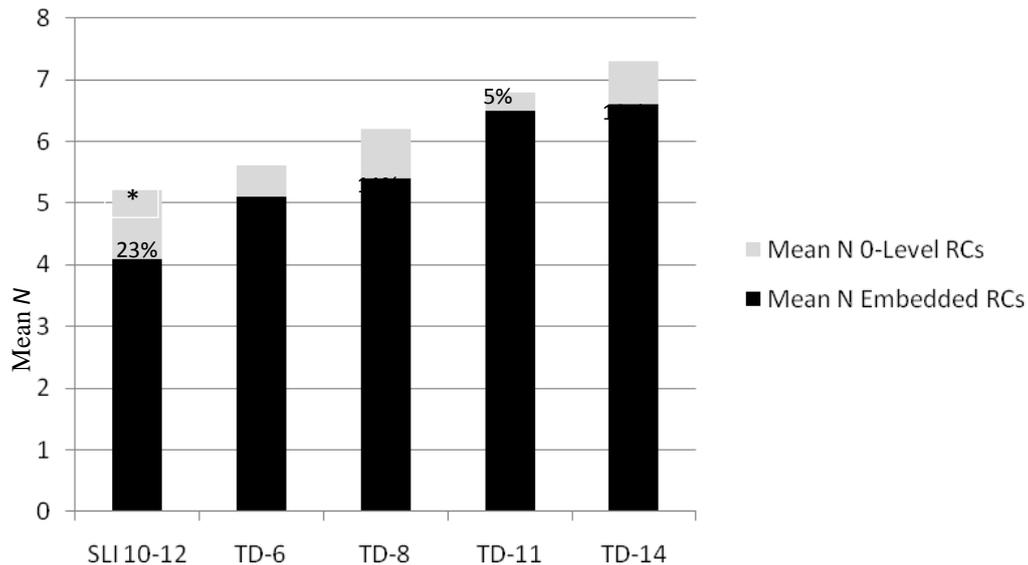


Figure 5. 0-Level Relative Clauses (Mean N and %) and Embedded Relative Clauses (Mean N)

The mean rate of 0-level RCs over total RCs was 22.9% (SD 14.0) in the SLI 10-12 group, significantly higher than in the TD6 group ($M = 7.3\%$, $SD 10.8$; $U = 38.5$, $p < .01$), than in the TD8 group ($M = 10.6\%$, $SD 13.4$; $U = 50.5$, $p < .05$), than in the TD11 group ($M = 4.9\%$, $SD 8.3$; $U = 32.0$, $p < .01$), and also than in the TD14 ($M = 9.6\%$, $SD 11.9$; $U = 46.0$, $p < .05$). Inter-group differences in the mean numbers of RCs per participant (both for 0-level and for embedded RCs) were not significant.

We turn now from the least embedded RCs (0-Level) to deeply embedded RCs, those RCs which are embedded deeper than Level-1, illustrated in (37), which contains two RCs, the first of which is a Level-3 RC [REL3-S], since it is embedded in a non-finite complement clause [NFC2], which is itself embedded in an adverbial clause [ADV1], itself embedded within the matrix clause [ROOT].

- (37) et euh donc comme ils voudraient [ADV1] trouver [NFC2] un une espèce de &bah> une personne qui pourrait &m qui pourrait [REL3-S] m le ramener ils ont ils ont vu [ROOT] cette jeune fille là et ... qui ressemble [REL1-S] à Cléopâtre (TD14)
'And um so since they would like to find a a sort of a person who could um who could um bring him back, they they saw this girl there and who looked like Cleopatra'

While the SLI 10-12 and the three younger TD groups produced similar proportions of these RCs ($< 10\%$ of all RCs produced), TD-14 produced nearly twice as many ($M = 17.7\%$, $SD 12.7$), as is shown in Figure 6. Nearly all TD-14 participants produced at least one deeply embedded RC (10/12 participants), whereas only one third to one half of participants in the other groups did so. A Kruskal-Wallis ANOVA showed a trend toward a group effect ($H = 4$, $p = .065$), and paired comparisons showed that the TD-14 produced

significantly more deeply embedded RCs than the TD-6 ($U = 35.5, p < .05$), the TD-8 ($U = 38.0, p < .05$), and the SLI ($U = 43.0, p < .01$) (no other differences were significant).

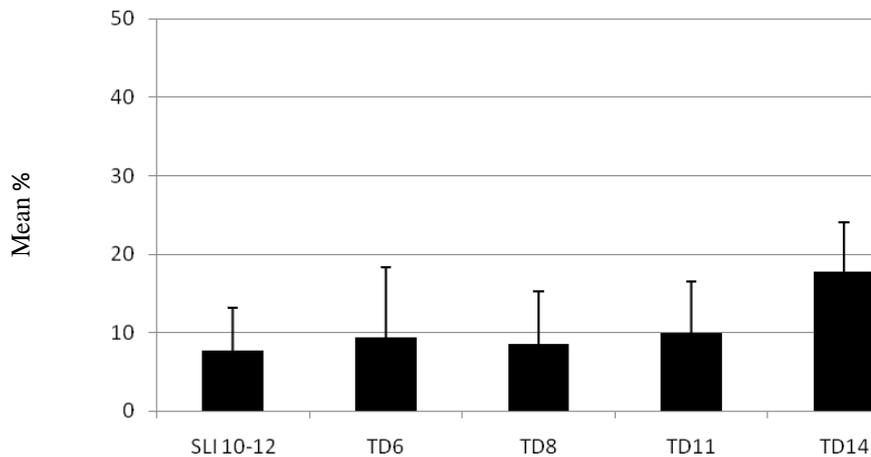


Figure 6. Mean % of RCs > Level-1

When we examined all embedded RCs, those which are deeply embedded and those which are embedded merely at Level-1 (and thus putting aside 0-level RCs, which are, by definition not embedded in a clause), the embedding factor manifested itself in the relative frequency of genuine relatives versus superficial relatives (clefts, presentationals, *avoir* with event reading, dislocated relatives). Figure 7 shows a rather sharp developmental profile among TD groups, TD-6 children producing proportionally fewer genuine RCs (M 17.1%, SD 21.0) compared to the other age groups (TD8 M 44.0%, SD 31.2; TD11 with a M of 41.7%, SD 19.8, and TD14 with a M of 55.8%, SD 20.7), and demonstrates that the SLI children, at 17.9% (SD 22.5), produced RCs like their language matches (TD-6) did, not like their age matches (TD11). A Kruskal-Wallis ANOVA showed a significant effect for group ($H = 24.369, p < .0001$), and paired comparisons showed that both TD6 and SLI 10-12 produced significantly lower rates of genuine RCs than each of the other groups (SLI vs. TD8, $U = 49.5, p < .05$; SLI vs. TD11, $U = 43.0, p < .05$; SLI vs. TD14, $U = 20, p < .001$;). The difference between SLI 10-12 and TD6 was not significant ($U = 68.5, p = .299$), nor was that between TD8, TD11, and TD14. Chi-2 analysis showed that there were indeed significantly more superficial RCs than genuine-RCS in the SLI ($\chi^2 = 15.61, p < .001$) and the TD6 ($\chi^2 = 16.1, p < .001$), but not in any of the other groups.

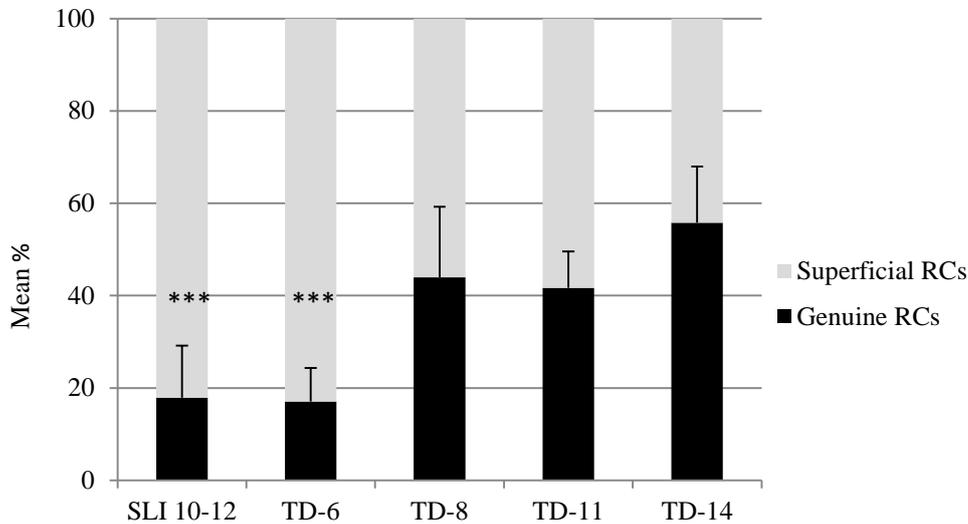


Figure 7. Genuine Relative Clauses versus Superficial Relatives (Mean Proportion)

In order to isolate the depth of embedding factor from the intervention factor, it is useful to look exclusively at SRs, as these do not also involve a potential RM configuration. Figure 8 shows once again the SLI 10-12 group patterning with the TD-6: both of these groups displayed a low rate for genuine SRs (with mean rates of 9.6 and 5.8%, respectively) compared to superficial SRs. The rate of genuine relatives was much higher in the other TD groups, nearly reaching half of all SRs in the oldest group (with means of 37%, 39.4%, and 47%, respectively, in TD8, TD11, and TD14). A Kruskal Wallis ANOVA showed a significant effect for group ($H = 25.40625$, $p < .001$). As was the case for over-all rates of genuine RCs, differences between each of SLI 10-12 and TD6 were significantly lower than those in each of TD8, TD11, and TD14, though they did not differ from each other, nor did any of the rates between the other three groups (SLI vs. TD8: $U = 49.5$, $p < .05$; SLI vs. TD11: $U = 43.0$, $p < .05$; SLI vs. TD14: $U = 6.5$, $p < .001$; TD6 vs. TD8: $U = 25.5$, $p < .01$; TD6 vs. TD11: $U = 17.5$, $p < .01$; TD6 vs. TD14: $U = 6.5$, $p < .001$; SLI vs. TD6: $U = 68.8$, $p = .294$; TD8 vs. TD11: $U = 68.0$, $p = .807$; TD8 vs. TD14: $U = 68.0$, $p = .10$; TD11 vs. TD14: $U = 45.0$, $p = 1.56$).

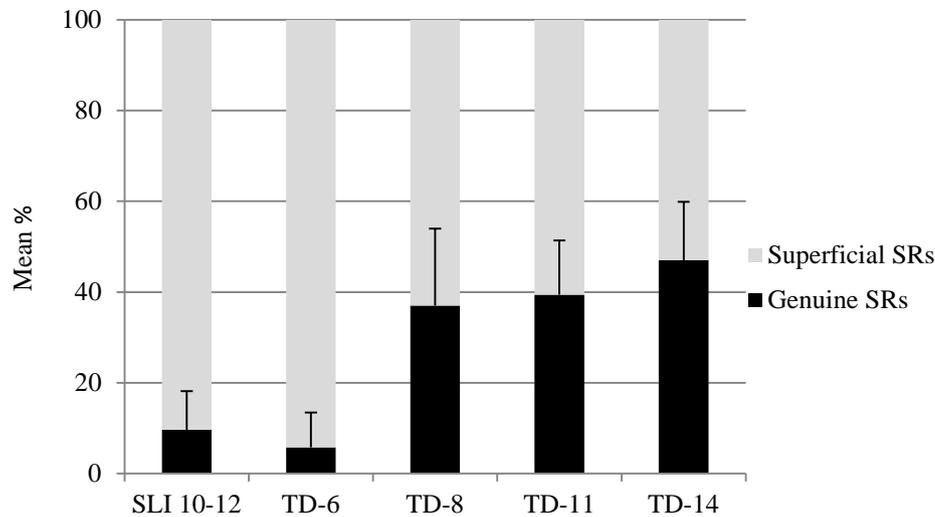


Figure 8. Genuine Subject RCs versus Superficial Subject RCs (Mean Proportion)

Likewise, when we control for depth of embedding by considering only genuine relatives, as in Table 2, it is interesting to note that the subject-object/adjunct asymmetry illustrated in Figure 4 above becomes less obvious. As we have just seen, in Figure 7, genuine relatives were extremely rare in both the SLI group and the MLU-matched TD 6: This was true for both SRs (mean N of 0.3 in each group) and non-SRs (mean N of 0.3 for ORs in each group, and no TD6 tokens of genuine ARs, and a mean of 0.2 in the SLI group). Although the TD8 and the TD14 did produce more genuine SRs (means of 1.4 and 2.5, respectively) than genuine ORs/ARs (means of 0.3/0.1 and 0.8/0.3), no such asymmetry was found in the TD11 (19 occurrences of genuine SRs and 16 occurrences of non-S RCs).²⁰

	N Tokens in each group			Mean N per participant		
	SR	OR	AR	SR	OR	AR
SLI	5	5	3	0.3	0.3	0.2
TD6	3	4	0	0.3	0.3	0
TD8	17	4	1	1.4	0.3	0.1
TD11	19	14	2	1.6	1.2	0.2
TD14	30	10	4	2.5	0.8	0.3

Table 2. Subject, Object, and Adjunct Genuine Relatives: Tokens and Mean N

²⁰ If only transitive verbs are considered, the picture also changes (see Belletti & Chesi 2011, on adult Italian): Jisa & Kern (1998) argued that transitivity of relative clauses is a factor of complexity that blocks children's use of RCs for narrative advancing. In their study, 5-, 7-, and 10-year-olds produced only roughly 1/3 RCs with a transitive verb, compared to 1/2 of adults RCs. The logic behind restricting counts of SR to transitive verbs would also seem to imply that ARs should be calculated in some way over total number of adjuncts produced.

Although this result suggests that a deeper analysis of the nature of the occurring interveners in genuine ORs is necessary (see Belletti & Chesi 2011; Arosio et al. 2011; Hamann & Tuller 2010), it is noteworthy that the subject/non-subject asymmetry is visible in clefts, precisely in the younger TD groups and in the SLI group. The lack of intervention effects in genuine relatives and the presence of these effects in clefts go together, we would argue. Genuine relatives are avoided so much that it is difficult to see the S/O asymmetry. Clefts don't have the added depth of embedding factor and thus are not avoided to the same degree and therefore the S/O asymmetry is visible, in the SLI, TD6 and TD8 groups, but not really in the older TD groups (TD11 and TD14), as can be seen in Table 3.

	N Clefts in each group			Mean N per participant		
	SR	OR	AR	SR	OR	AR
SLI	7	1	3	0.5	0.1	0.3
TD6	11	3	2	0.9	0.3	0.2
TD8	6	1	1	0.5	0.1	0.1
TD11	3	2	4	0.3	0.2	0.3
TD14	5	2	1	0.4	0.2	0.1

Table 3. Subject, Object, Adjunct Clefts: Tokens and Mean N

Summarizing the empirical evidence provided here, we have seen that language samples of the children with SLI, besides showing more erroneous RCs (Fig. 2) and more active avoidance of RC production (Fig. 3), display the following properties: 1) high rates of 0-level RCs (Fig.5), 2) low rates of deeply embedded RCs (Fig. 6), and 3) high rates of superficial RCs compared to genuine RCs (Fig. 7). In the TD-groups, higher levels of deep embedding are only observed in the group of adolescents (Fig. 6), whereas the rate of genuine relatives in the TD-6 is comparable to that of the SLI-group and significantly lower than the rates in the groups with older children and adolescents (Fig. 7). The language samples analyzed also revealed a general SR-OR/AR dissociation across all groups (except TD-11, Fig. 4), which becomes less clear when only genuine relatives are examined (Table 2). On the other hand, when the SR-OR/AR dissociation is neutralized, and we concentrate only on RCs that do not also display intervention (i.e. SRs), the embedding factor sharply emerges (Fig. 8).

4. Discussion and Conclusion

The aim of this article was to explore the nature of syntactic complexity through close examination of depth of embedding. French has several constructions which resemble RCs, but which are actually flatter in structure: these include clefts and presentational constructions introduced by *c'est* and *il y a*. We have proposed here an analysis of presentational *c'est* and *il y a* which identified a common underlying structural property in these constructions. *Avoir* 'have' in these cases selects a small clause CP complement just as in presentational *c'est* so that the apparent relative actually expresses predication. In the case of *il y a*, which can only have event readings, it is the whole small clause which is subsequently fronted to the position reserved for new information focus in the lower topic/focus field above vP. For event readings of *c'est*, we proposed the same analysis,

whereas movement of the DP into this low focus position allows new information focus on this DP alone. Contrastive clefts, on the other hand, are derived by moving the DP to the high focus position in the left periphery of the CP. It is the fact that all these so-called “superficial relatives” involve movement of the DP to a focus position from a CP which functions as a small clause predicate which makes them flatter and less complex than genuine RCs. In this light, contrastive clefts and presentational constructions are alike in terms of depth of embedding since they do not involve embedding within a DP. The difference between these constructions was located in the fact that, in the case of presentational constructions, the DP is the subject of the embedded small clause, whereas this is not the case for contrastive focus. The analysis also captured the fact that contrastive clefts can focus the subject or the object of the predicational CP, whereas presentational structures can only focus the subject (or the whole event). This difference was derived from Relativized Minimality and predicts that object clefts can be subject to intervention effects as described for ORs (see Gordon et al. 2001; Del Puppo 2016). Making use of the higher and lower focus fields, in the vein of Belletti (2008), and additionally postulating movement of the whole small clause allowed us to capture the event semantics as well as the discourse effects apparent in these structures.

Our analysis entails in particular that complexity in RCs should not be solely characterized by the presence of *wh*-movement or the presence or absence of interveners between the target and the original position of the moved constituent, but that a distinction should be based on the depth of embedding. Our classification of RC’s according to depth of embedding, summarized in (31) and repeated here as (38) for convenience, thus highlights the fact that in superficial relatives (38b, c) there is in fact no DP recursion, in other words, no embedding of a CP (containing DP constituents) within a DP. Likewise we do not find true CP recursion since the embedded CP in these constructions is a truncated small clause CP.

- (38) a. Genuine relatives (CP inside DP, inside IP; CP inside CP)
 b. Contrastive clefts (XP in left-peripheral focus position, not inside DP; truncated CP)
 c. Presentational focus (DP/small clause CP in low focus position, not inside DP)

Following up on earlier observations of French child language (Labelle 1990, 1996; De Cat 2002; Hamann et al. 2007; Delage et al. 2008; Tuller et al. 2012), we have reported on results of systematic investigation of the notion of depth of embedding in the production of RCs in TD children and also in children with SLI. Taking seriously our analysis of superficial relatives, broadly interpreted to include all those RCs whose structure is in a definable way flatter than a genuine RC embedded within a sentence, we looked at the relative proportions of these types of RCs in child language. The evidence is quite overwhelming in the case of children with SLI, who are particularly sensitive to derivational complexity (as many studies have shown). Our results showed this sensitivity to the combined factors involved in complexity (movement, intervention and depth of embedding) in the SLI group in the high rate of erroneous RCs and also in the high rate of active avoidance, neither of which were found in any of the TD groups. In addition to these general measures of complexity, the children in the SLI group manifested specific sensitivity to the depth of embedding factor. They produced many more unembedded RCs (0-level RCs) than the children in each of the TD groups, including both younger, language-matched children, and age-matched children. Along with the youngest TD

children (the 6-year-olds), the SLI children, who were aged 10 to 12, had far lower rates of genuine RCs compared to all of the other TD groups (including the 8-year-olds). The TD14, on the other hand, were the only group displaying high rates of very deeply embedded RCs (> level-1), significantly more than each of the other groups. As expected, the SLI group provided the clearest picture of the effect of computational complexity in general, and depth of embedding in particular, on syntactic processing, and a developmental trend is found in the TD groups.

We would like to emphasize that the impairment effect and the developmental trend are thus observed in the data on genuine relatives versus superficial relatives, which we uniformly analyzed as not involving DP (or CP) recursion. This trend was even sharper when potential intervention effects, possible in non-SRs, are factored out: SLI and TD-6 once again patterned together, with very low production rates for genuine SRs (9.6 % and 5.6% respectively) compared to a significant rise in production of genuine SRs in the older TD groups, which almost reaches the 50% level in the TD-14.

While the factor of intervention (see Friedmann et al. 2009; Belletti and Contemori 2010; Belletti and Rizzi 2012; Belletti et al. 2012) was corroborated by the rarity of non-subject relatives and non-subject contrastive clefts in spontaneous production in our groups, we also found that the Subject/Non-subject dissociation could no longer be clearly established when depth of embedding was factored out.

Analysis of spontaneous production has thus provided significant evidence for the influence of depth of embedding on production, and for the syntactic analysis this was based on, the analysis of superficial RCs as lacking the degree of embedding found in genuine RCs. As predicted, the fact that they are less complex (since they do not involve true recursion) had an impact on frequency of their production in spontaneous speech.

Besides looking at the relation between depth of embedding and intervener and frequency of types of RCs, our study looked at more “active” avoidance of RCs and found children with SLI to behave differently from all of the TD groups, including their age-matches, the TD6. Not only were their sentences containing RCs much more error-prone than those of even the youngest TD children, they made significantly more failed attempts at RC production than TD children (more juxtaposed root clauses, self-interruptions of RCs). Thus, although the children in the SLI 10-12 group produced on average very few RCs ($M = 4.1$), they seem to have set out to produce more of them, and, when mean number of attempts at RCs ($M = 1.3$) are added to the RCs which actually surface, the SLI 10-12 group in fact resembles more closely their language matches (TD6 group) for production of RCs ($M = 5.4$). We believe that these are valuable data, not readily available in elicited production.

Elicited production data (such as those presented in Friedmann et al. 2009), on the other hand, typically give rise to production of 0-level RCs, and thus study intervention effects at this level only or without taking into account whether the RC is embedded or not within a sentence. Study of spontaneous language production provides the possibility of comparing production of 0-level relatives with RCs which are embedded within a matrix clause. Our data have demonstrated a developmental trend in this regard: 14-year-olds produced significantly more RC's which were deeply embedded, whereas the children with SLI produced significantly more 0-level RCs than the children in the other groups. We have argued that these data show that depth of embedding figures prominently in the calculation of derivational complexity.

Our study of genuine and superficial RCs in spontaneous production, joining a long tradition in child language studies, has analyzed the frequency of occurrence of these

different constructions as a result of the complexity of the linguistic calculation in their derivation. It was suggested that younger children and children with language impairment avoid constructions entailing greater complexity and thus the relative frequency of the least complex constructions is greater in these children. Developmentally, avoidance declines as children are more able to cope with linguistic complexity, and thus the frequency of more complex constructions increases with age. Evidence for this scenario has been provided here, including data from children with SLI which illustrates “active avoidance” of complexity in the form of attempts at RCs, which are abandoned in favor of juxtaposed clauses, etc. This scenario raises the question of look-ahead. How does the child know what to avoid without “looking ahead” to see what would happen if a particular derivation is pursued? This question would seem to be identical to the question of parsing preference in comprehension. Grillo (2012) argued that locality in parsing is a universal principle of processing, and showed that adults are sensitive to complexity of syntactic and semantic structure in comprehension of sentences in which attachment of an RC is potentially ambiguous. He presents cross-linguistic experimental evidence showing that adults in languages in which a pseudo-relative analysis is possible, prefer that interpretation because it is less complex. Here we have argued that children, and particularly those with language impairment, are sensitive to these same considerations in production, preferring pseudo-relatives over genuine relatives because the former entail derivations with less complex syntactic (and semantic) calculation.

We conclude that depth of embedding is a factor which is clearly visible in spontaneous production as greater frequency of occurrence of less deeply embedded structures in younger TD children and in children with language impairment. This factor has particularly sharp consequences in constructions where intervention does not play a role (i.e., SRs), a result which might indicate that in spontaneous production depth of embedding contributes to processing load at least as much as the presence of potential interveners. Our findings concerning depth of embedding confirm the importance of the embedding factor, already pointed out by Kimball (1973). Kimball established a relation between depth of embedding and working memory: the number of incomplete clauses that must be stored in memory at any given moment crucially influences processing load. In more recent terminology, it is the notion of cycle or phase that is pertinent here, in that the difficulty with embedding arises because the calculation cannot be closed as long as the cycle or phase is still open. In particular, it is antecedent-gap relations which cannot be resolved within one clause/cycle and thus have to activate the respective phase edges in order for pertinent features to remain visible for derivation of the higher phases. In these open dependencies the second factor influencing computational complexity, the factor of intervention due to similarity of elements in grammatical features, becomes relevant since depth of embedding and intervention both entail keeping in mind some structural relation/features while another calculation is being undertaken. Deep embedding requires keeping clauses in mind, and, potential intervention, as Friedmann et al. suggest, requires a calculation of which DP goes with the gap via comparison of (sub)sets of features. Clearly, these two factors interact, as we have argued: both crucially impact the processing of unresolved dependencies.²¹ In the case of RCs and superficial relatives, which we have analyzed as involving true DP and CP recursion in the first, but not the latter case, there may be another property which these factors share. Intervention and ultimately Relativized Minimality effects are due to

²¹ Whereas intervention has been prominent in processing theories, depth of embedding has not. How existing theories, such as Gibson’s (1998), could eventually incorporate this notion is beyond the scope of this article.

structural similarity which makes it difficult to keep elements differentiated during computation. Genuine RCs involve true recursion, which by definition requires structurally identical elements (DPs and CPs). Under the assumption that other cognitive components such as working memory interface with grammar, storage during computation may be difficult because of similarity. Superficial relatives, as we have argued, do not involve this kind of true recursion, i.e. similarity, and are easier to process. Depth of embedding, and recursion in particular, i.e. the presence of dependencies across similar cycles and the occurrence of similar syntactic objects in these dependencies, can therefore be identified as the factors pertinent in the computation of RCs.

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