To Move or Not To Move?
Movement, Intervention
and Optionality in the Acquisition
of A'-dependencies in French

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Introduction

The general cross-linguistic picture for the acquisition of A'-dependencies shows that they do not all emerge at the same point in time. Both *wh*-questions and relative clauses (RCs) are acquired as early as 3-4 years old when the head of the dependency is the subject (see examples in (a) below). Object dependencies with a 'bare' (–NP) moved element (i.e. *who*-questions and 'free' RCs) illustrated in (1b) and (4b) are also consolidated early (Avrutin 2000, Friedmann, Belletti & Rizzi 2009). In contrast, object dependencies with a lexical restriction (meaning sequences such as '*the/which + NP*', given in (2b) and (3b)) are difficult for children to comprehend until around the age of 6 (Corrêa 1995, Adani 2011, Friedmann et al. 2009, a.o.):

(1) a. Who [___ is kissing the girl]?
  b. Who is [the girl kissing ___]?
(2) a. Which boy [___ is kissing the girl]?
  b. Which boy is [the girl kissing ___]?
(3) a. The boy that [___ is kissing the girl].
  b. The boy that [the girl is kissing ___].
(4) a. Show me who [___ is kissing the girl].
  b. Show me who [the girl is kissing ___].

Children's persisting difficulties with structures like those in (2b) and (3b) have been accounted for in terms of intervention effects (Friedmann

et al. 2009) related to the locality principle of Relativized Minimality (RM) (Rizzi 1990, 2004). RM states that a syntactic relation cannot hold between two elements X and Y if Z intervenes and if Z bears the same syntactic features to those present on X. This is schematically illustrated in (5):

(5) X … Z … Y

The ungrammaticality of (6), where a *wh*-element crosses over another *wh*-element, follows straightforwardly from RM:

(6) *Who did you say where the girl kissed <who>?[1]

The parallelism between structures like (2b), (3b), and (6) has been applied to explain the selective difficulties children experience with certain A'-object dependencies. A stricter version of RM would be at play in early grammar systems than in adult systems (Friedmann et al. 2009). Thus in (2b) and (3b), the presence of the intervening subject (*the girl*) disrupts the A'-chain created between the moved object (*which/the boy*) and its argumental position. This is determined by the presence of a [+NP] feature, on both the embedded subject and the head of the object-dependency. Children's improved performance with both –NP object RCs and –NP object *wh*-questions provides support for this approach in showing that they easily establish the dependency between the A'-moved object and its trace once the moved element and the intervening subject do not share the feature [+NP].

However, in the studies presented above, there is no consideration of examples such as the following, where the –NP / +NP elements appear in-situ:

(7) The girl is kissing *who/which boy*?

Testing such cases can prove crucial in determining if the RM effects observed until now are restricted to instances of overt *wh*-movement. Moreover, in languages where in-situ *wh*-questions co-exist with an ex-situ option (such as 8), one can assess how the presence of optional movement influences parsing of dependencies that involve movement.

(8) *Who/which boy* is the girl kissing?

More specifically, such a scenario would enable us to explore how the acquisition of a structure with competing options compares to that of a structure of similar complexity without such options. French, as we show in more detail in section 1.1, is a suitable language for investigating this comparison. Matrix *wh*-questions in French allow the *wh*-element to remain in-situ or be fronted to spec-CP (with or without the filling of C), whereas no such optionality applies in RCs. A comparison across A'-dependencies is thus particularly interesting in determining the impact that movement optionality has on the comprehension of these two types of structures, a phenomenon that has remained unexplored to date in the acquisition literature.

The 'balancing act' between the input consisting of several structural options, as well as the tendency for economy, has been proposed to result in a preference for the more economical option (the one that requires the least movement) until sufficient evidence in the input allows children to switch to the more costly strategy involving movement (Zuckerman & Hulk 2001). The crucial idea is that a child with input divided between two structural options may show some repercussions of this in his/her acquisition, plausibly resulting in a preference for the more economical option in production, and, we hypothesize here, a better mastery of this option in comprehension.

This reasoning can also be applied to bilingual acquisition. One relevant illustration is a child acquiring two languages with distinct strategies for question formation, namely one language with *wh*-movement and one without. The fact that the input contains both of these structures could arguably result in predominance of the more economical configuration in the child's grammar. Indeed, this has already been observed by Yip and Matthews (2000) who study a bilingual child acquiring Cantonese (a *wh*-in-situ language) and English (a *wh*-ex-situ language). The preference for in-situ *wh* that is observed in this child's language is accounted for in terms of the predominance of Cantonese in the input. However Lai (2006, cited in Tieu 2010) argues that such an approach would predict that a child with predominant English input would favour wh ex-situ influence from English to Cantonese. She reports instead that even in such contexts, *wh* in-situ still prevails as the preferred option. Thus, it seems that whenever the child is confronted with two options, in this case with options exploited by two different linguistic systems, the child favors the more economical one. One may take this reasoning further to predict that even in a case where the two options are present in one and the same linguistic system (as is the case for *wh*-questions in French which allows both in-situ and ex-situ *wh*-elements),

the same pattern would arise, yielding a predominance of in-situ in production. If phenomena such as this are observable in production due to an underlying grammatical property, it is reasonable to hypothesize that appropriate experimental research will also reveal its effects in comprehension. Finally, if a construction of similar complexity does not present a simpler structural alternative, the child is left with no option but to exploit movement. Such increased exposure to movement in the context of that precise construction, and hence more 'forced' practice with it, could conceivably lead to better mastery of movement in these cases than in cases where movement is not the only possibility.

In this study we thus aim to examine the comprehension of A'-dependencies with or without optional movement, headed by both +NP and –NP elements. The goal is to determine the effect of structural features that modulate comprehension of A'-constructions in child language, as well as to better understand the repercussions of structural optionality on acquisition. Given that *wh*-movement is optional in French *wh*-questions but obligatory in relative clauses, the aim is to compare across A'-dependencies that differ in terms of movement optionality in order to better assess the impact of this syntactic property on the process of acquisition.

In sum, we seek to investigate (i) *the role of movement*, by assessing whether overt A'-movement is a computationally complex operation regardless of the featural specification (+/-NP) of the moved elements, (ii) *the impact of intervention*, by exploring how the +/-NP featural specification of the head of the A'-dependency affects parsing, regardless of the overt or covert nature of movement, and (iii) *the effect of optionality*, by determining if A'-movement (here *wh*-questions and RC) manifests different degrees of complexity depending on the presence (*wh*) or absence (RC) of optional movement. This work is part of a more general study on the acquisition of French which analyzes the impact of structural and featural complexity across A'-dependencies and age groups.

The paper is organized as follows: in section 1 we briefly describe the syntactic structure of *wh*-questions and RCs in French and recapitulate previous findings on the acquisition of these specific constructions. In section 2 we present the experimental study and the results. We discuss our findings in section 3. Section 4 concludes the paper.

1. The syntax and acquisition of French A'-dependencies

1.1. WH-constructions

French has several strategies to form matrix questions with a *wh*-phrase. These are illustrated in Table 1:

Table 1: Typology of *wh*-constructions in French

Wh-constructions	Examples
wh in-situ	(9) Tu vas où? you go where
wh ex-situ no inversion	(10) Où tu vas? where you go
wh ex-situ with clitic inversion	(11) Où vas-tu? where go you
wh ex-situ with stylistic inversion	(12) Où va Pierre? where goes Peter
wh ex-situ with complex inversion	(13) Où Pierre va-t-il? where Peter goes-he
wh ex-situ with ESK	(14) Où est-ce que tu vas? where ESK you go
wh ex-situ with stylistic inversion and ESK	(15) Qui est-ce qui filme le roi ? who ESK films the king

Table 1 shows that the *wh*-element can remain in-situ as in (9); it can be fronted to spec-CP without subject-verb inversion (example (10)) or it can be accompanied by inversion, illustrated in examples (11) through (13). (12 & 15) are instances of stylistic inversion, where the subject is realized at the end of the utterance. French also allows the option of having a *wh*-fronted element with *est-ce que* (ESK) insertion in C, exemplified in (14 - 15) above. Note that *wh*-fronting is obligatory in ESK questions and that movement of the verb to C is impossible in this construction since ESK occupies the C position[2]. French children master *wh*-questions rather early and they already produce such questions around the age of 2;0, as illustrated by various studies of children's spontaneous productions (Hulk, 1996; Plunkett, 1999; Hamann, 2000). Regarding the position occupied by the *wh*-word in these

early questions, most children start with *wh* in-situ, as it was found for Augustin and Marie, the children of the Geneva corpus examined by Hamann (2000, 2006). Questions with a fronted *wh*-element only account for 10% of the total number of *wh*-questions produced by Augustin (from 2;0.2 to 2;9.30) and Marie (between the age of 1;8.26 and 2;3.3). Other children, however, may produce more questions with *wh*-fronting in the early stages of acquisition. This is the case of Philippe (data collected by Suppes et al., 1973) who only produces one in-situ *wh*-question between the age of 2;1.19 and 2;3.21 and otherwise produces exclusively *wh*-questions with a fronted element (see Hamann 2000). An elicited production study (Hulk & Zuckermann, 2000) showed that younger children prefer forming questions with *wh* in-situ, whereas children aged 4 to 5 produce a greater number of questions with *wh* ex-situ. Various studies have also shown that there is a delayed development of ESK questions and that French children start producing questions with ESK only around the age of 2;8 (Plunkett, 1999, Jakubowicz 2004, 2005).

Haiden et al. (2009) looked at the comprehension of subject and object *who*-questions in typically developing (TD) French children and children with specific language impairment (SLI). They showed that TD children aged 4 and 6 understand *wh*-questions with or without ESK and *wh* in-situ questions equally well. Children perform the lowest on the comprehension of questions involving a *wh*-element ex-situ coupled with stylistic inversion, as shown in (12) above (37.2% correct responses for 4-year-old TD children and 54.2% correct responses for 6-year-old TD children). A significant difference between *wh* in-situ and plain fronting was reported for children with SLI.

The preference found for in-situ *wh*-questions, as well as the late emergence of ESK questions and of questions with *wh*-movement and inversion have been accounted for in terms of the Derivational Complexity Metric[3] (Jakubowicz 2004, 2005, 2011, Prévost et al., 2010, Strik 2008). Under this perspective, *wh* in-situ elements are less complex than fronted *wh*-elements, because movement adds complexity to the structure. According to this hypothesis, children start with the least complex option (*wh* in-situ) and gradually move to computationally more complex options involving *wh*-fronting, subject-verb inversion and stylistic inversion. These structures are acquired later since they involve movements of the *wh*-element, the verb and the subject. The crucial observation here is that the more movement operations a given construction requires, the more computationally costly it is for children. This analysis also explains the late development of ESK questions in production, which involve an extra

Merge operation for the appearance of ESK in C and are thus associated with an increased derivational complexity.

However, none of the previously mentioned studies have investigated the acquisition of *which*-NP questions. Exploring the impact of these questions both in ex-situ and in-situ contexts would provide empirical support for determining the featural properties that trigger intervention effects in children, as well as shed light on the syntactic analysis assigned to *wh* in-situ in French, which has been a matter of debate in the literature. Structures like in (7) above have been assumed to have the same logical form as that of an ex-situ question (Huang 1982), i.e. 'for what x [... x ...]'. *Wh* in-situ elements are considered on a par with quantifiers and covert movement is generally admitted for in-situ questions since this movement produces the relevant operator-variable structure. However, work since the late 90's show that there are different types of *wh* in-situ yielding different treatments: covert phrasal movement, no movement, feature movement (see Cheng 2003 for a review). As for French, it has been argued that *wh* in-situ undergoes *wh* feature movement and is therefore sensitive to constraints on movement and chain formation (Mathieu 1999; Cheng and Rooryck 2000, Baunaz 2011; see Shlonsky 2012 for a recent summary). In this context, investigations into the acquisition process of such structures can bring us to a better understanding of how in-situ *wh*-elements are interpreted and whether and how covert movement is involved.

1.2. Relative Clauses

Relative clauses in French are introduced by complementizers, which vary in form according to the type of RC: *qui* appears with subject RCs (example (16)), while *que* introduces object RCs (example (17)):

> (16) Le   garçon *qui* embrasse la   fille
>   the boy   that kisses   the girl
>   'The boy that kisses the girl.'
> (17) Le   garçon *que* la   fille embrasse
>   the boy   that the girl kisses
>   'The boy that the girl kisses

The acquisition of RCs in French has been mainly studied in production. The mechanisms children use to derive these constructions have represented a source of debate in the L1 acquisition literature. Labelle (1990, 1996) argues that, although *wh*-movement appears in early *wh*-questions, this option is not available in RCs, at least until 6 years of

age, despite the evidence children get from the input. Labelle (1990, 1996) bases her account on the absence of pied-piping and the abundant use of resumptive pronouns in child RCs, strategies which are ungrammatical in standard French. On the other hand, Guasti & Shlonsky (1995) and Guasti & Cardinaletti (2003) argue that movement is involved in the derivation of RCs in early grammars. Therefore, child grammar makes use of a mechanism also present in the adult grammar. To our knowledge, only one unpublished study, Coyer (2009) has investigated French children's comprehension of RCs, suggesting the presence of a subject-object asymmetry in this language as well, while leaving open the question as to how performance for RCs compares with performance for other A'-dependencies such *wh*-questions.
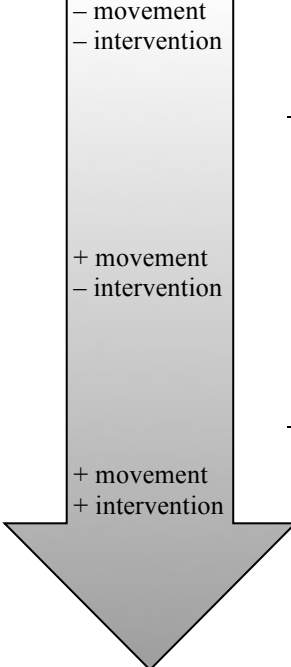
2. The Study

This work contributes to filling the lacuna in the literature on the acquisition of A'-constructions in French[4] by providing the first comparison of comprehension of *wh*-questions and RCs. We assess the comprehension of both –NP (*who*) and +NP (*which*) questions, in an attempt to show how children perform with +NP questions with and without *wh*-movement and whether these results are comparable to those obtained so far for –NP questions. We further address the less researched question of the comprehension of RCs and how the acquisition of these structures fares in comparison to that of wh-questions.

We start from the hypothesis that the existence of competing structural options yields a complexity scale in which various factors are at play: (i) the presence or absence of movement of the A'-object (i.e. +/– movement), (ii) the presence or absence of an alternative to movement for realizing a given construction (+/– movement optionality) and (iii) the presence or absence of intervention effects determined by a similar featural specification on the elements of the A'-chain (i.e. +/– featural intervention). This is schematically represented in Figure 1.

As previously underlined, French offers a useful testing ground for this hypothesis since it displays various possibilities for question formation, allowing *wh*-elements to appear either fronted or in-situ, while relative clauses do not present these alternatives. Several predictions follow from the above hypothesis for the acquisition of A'-dependencies in French.

Figure 1: Complexity hierarchy

+/–Movement Optionality +/–Featural Intervention	Examples
– movement – intervention	(18) Le garçon lave *qui* ? The boy is washing *whom*?' (19) Le garçon lave *quel chat* ? 'The boy is washing *which cat*?'
+ movement – intervention	(20) Montre-moi *le garçon qui* lave le chat. 'Show me the boy that is washing the cat.' (21) *Qui/Quel garçon* lave le chat ? '*Who/Which boy* is washing the cat?' (22) *Qui est-ce que* le garçon lave ? '*Who* ESK the boy is washing?' (23) *Qui* le garçon lave ? '*Who* the boy is washing?'
+ movement + intervention	(24) Montre-moi *le chat que* le garçon lave. 'Show me the cat that the boy is washing.' (25) *Quel chat est-ce que* le garçon lave ? '*Which cat* ESK the boy is washing? (26) *Quel chat* le garçon lave ? '*Which cat* the boy is washing?'

If *movement* affects comprehension, then we expect children to perform better with [–movement] (examples (18) and (19)) than with [+movement] (examples (20) to (26)). In sum, children should better parse the more economical among the available structures. If *movement optionality* affects acquisition, then performance across structures with a similar level of complexity [+movement] should yield higher accuracy than constructions that do not display a more economical alternative. Therefore, in cases where movement of the A'-element is the only available option, namely [+NP] object RCs (example (24)), performance should improve as compared to cases where a competing [–movement] option exists, that is [+NP] object questions with *wh*-fronting, shown in (25) and (26).

If *featural specification* affects comprehension, children should have most difficulty parsing A'-dependencies that involve moving a [+NP]

element over the intervening subject which also contains a [+NP] feature. These structures display a [+movement; +intervention] configuration and include [+NP] object ex-situ questions (illustrated in (25) and (26) above) and [+NP] object RCs (as in (24)). Regarding [+NP] in-situ questions (example (19)), if children apply a covert phrasal movement analysis (along the lines of Huang 1982 a.o.), we expect them to perform on a par with [+NP] ex-situ questions. On the other hand, if children only move the *wh* feature (along the lines of Mathieu 1999, Shlonsky 2012), then no featural intervention should arise in these instances. This analysis therefore predicts better performance with in-situ structures than with their ex-situ counterparts.

2.1. Method

We tested the comprehension of A'-dependencies in French in an experiment involving two tasks. Twenty-eight items were used per task. First, we assessed the comprehension of *wh*-questions on four conditions exploring the role of (i) the extraction site of the *wh*-element, (ii) its featural make-up, (iii) its movement to [Spec,CP], and (iv) the overt filling of C° in object questions. 14 questions contained a [–NP] *wh*-element and 14 questions a [+NP] *wh*-phrase. There were 8 subject questions (illustrated in example (21) above), 8 object ex-situ questions without subject-verb inversion (as in (23) and (26)), 8 object in-situ questions (given in (18) and (19)), and 4 object ESK questions (see examples (22) and (25)). Second, we investigated the comprehension of 14 subject and 14 object restricted RCs, exemplified in (20) and (24) above. The experimental material was counterbalanced among participants.

Children were tested individually on a character-selection task preceded by a rich warm-up session aimed at familiarizing them with characters from the tasks and with precision pointing. There was a break in between the two tasks in order to minimize fatigue. Children saw two pictures at a time with the characters performing an identical action with reversed Agent-Patient roles (Figure 2)[5]. Before the test sentence, the experimenter provided a lead-in to the child: "Look, there are 2 cats and 2 boys!" The child was then prompted to point to the correct character as identified by a *wh*-question or a RC: "Which cat is the boy washing? / Show me the cat that the boy is washing".

Figure 2: Sample of experimental material
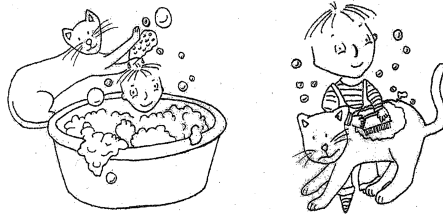
2.2. Participants

The subjects that took part in the experiment were 72 French-speaking children. Table 2 gives detailed information about the 4 age groups that we tested.

Table 2: Division of participants by age

| Groups	N	Age range	Mean age
5-year-olds	18	4;10 - 5;6	5;1
6-year-olds	19	5;7 - 6;6	6;0
7-year-olds	18	6;7 - 7;7	7;1
8-year-olds	17	7;11 - 9;10	8;7

2.3. Results

The results of the comprehension task with *wh*-questions (Figure 3) show that all children have most difficulties comprehending [+NP] object questions containing a moved *wh*-element. A repeated measures ANOVA indicates a main effect of structure type (subject, object ex-situ, object in-situ: $F(1,72) = 14.65$, $p < .001$) and of *wh*-element type ($F(1,72) = 20.58$, $p < .001$). There is also an interaction between structure and type of *wh*-element ($F(1,72) = 8.64$, $p < .001$) due to children's worse performance with fronted questions involving a [+NP] object than with those containing a [+NP] subject or a [–NP] object. Crucially, children across all age groups are at ceiling for *wh* in-situ questions, irrespective of the [–NP] / [+NP] featural specification of the *wh*-element.

Figure 3: Mean correct answers for *Wh*-questions
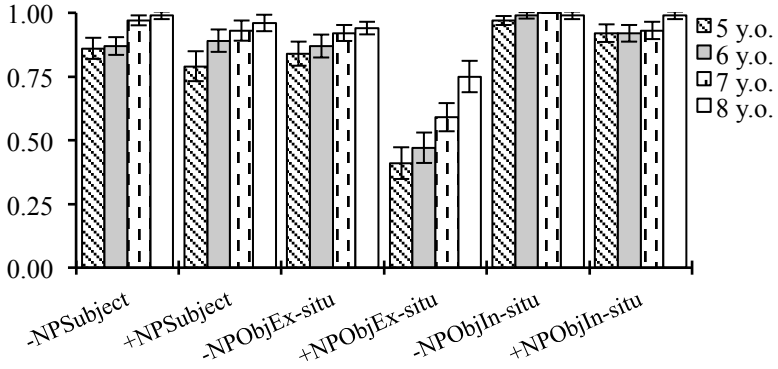
Children's comprehension of [+NP] RCs displays the same subject/object asymmetry present in [+NP] questions (Figure 4). Their accuracy scores are at ceiling with subject RCs, but their comprehension of object RCs is significantly lower. A repeated measures ANOVA shows a main effect of type of structure ($F(1,72) = 117.56$, $p < .001$).

Figure 4: Mean correct answers for RCs
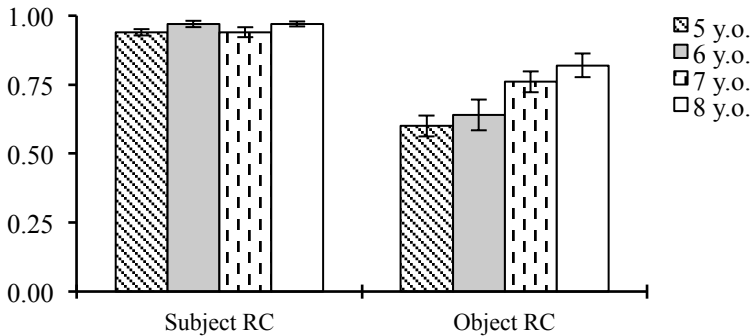
The scores obtained for the comprehension of A'-dependencies with a moved object (Figure 5) further reveal that children respond highly accurately for [–NP] object questions, as compared to both [+NP] object RCs and [+NP] object questions ($F(1,72) = 13.42$, $p < .001$). Moreover, [+NP] object RCs yield significantly better results than fronted [+NP] object questions ($F(1,72) = 25.01$, $p = .024$).

Figure 5: Mean correct answers for ex-situ object A'-dependencies
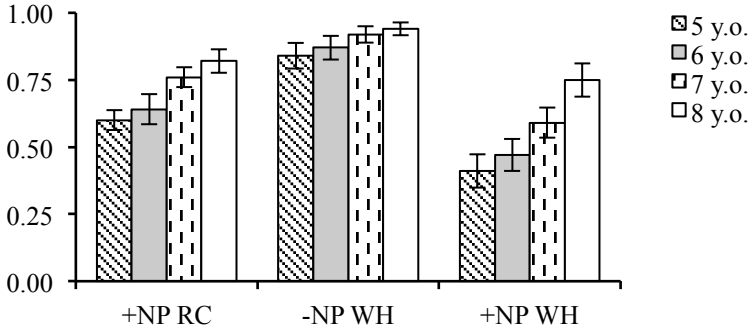
The [–NP]/[+NP] asymmetry holds for questions with ESK as well (F(1,72) = 99.05, p < .001). Interestingly, the insertion of ESK seems to improve comprehension of both [–NP] and [+NP] fronted object questions (Figure 6). Although this difference is not statistically relevant (F(1,72) = 13.30, p = .07), a distinct tendency to higher accuracy emerges in the presence of this question marker amongst the younger age groups.

Figure 6: Mean correct answers for object ESK questions
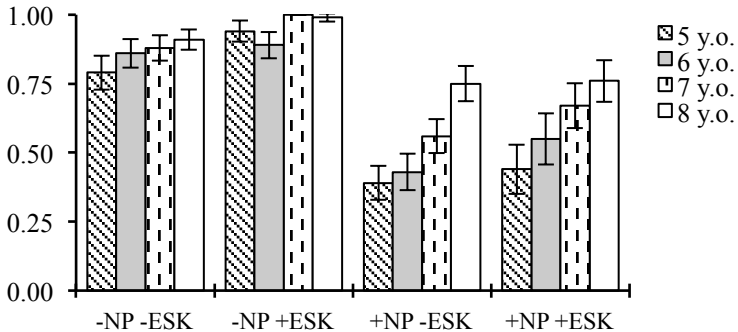
The only structures for which the comprehension scores showed a correlation with age were [+NP] object questions (r = .439, p < .001) and object RCs (r = .402, p < .001).

To sum up, our results confirm that in the early stages of acquisition children have more difficulties with [+NP] object RCs and [+NP] object questions than with subject dependencies. This asymmetry is not attested,

however, for [–NP] *wh*-questions, and crucially, it does not hold for *wh* in-situ questions, regardless of the presence of a [+NP] feature on the *wh*-element.

3. Discussion

The motivation for this study was to understand the interplay between structural complexity as induced by syntactic movement and featural specification in children's parsing of A'-dependencies in French. In addition, we aimed to determine how the optionality of movement affects acquisition.

Our results confirm previous findings for English (Avrutin 2000), Hebrew (Friedmann et al. 2009) and Italian (Adani 2011) illustrating the pronounced subject/object asymmetry for fronted [+NP] (*which*) questions and [+NP] (*headed*) RCs. In striking contrast are children's comprehension scores for *wh* in-situ questions, which yielded ceiling performance also with [+NP] elements.

The difference between accuracy for in-situ –NP and ex-situ –NP was marginally significant in the younger groups only, showing that a preference surfaces even in comprehension for the most economical, in-situ options. This testifies to the role of movement. However children globally showed significantly improved performance with fronted [–NP] object questions, with both [+NP] and [–NP] subject questions and subject relatives as compared to fronted [+NP] object questions and RCs. This shows that movement is not the main source of persistent complexity in comprehension. Rather, young children seem to have a pronounced difficulty with overt movement involving a richer morphosyntactic featural specification [+NP]. This is more taxing for computation and results in less accurate performance by immature or impaired systems because of their limited processing abilities (Delage 2008, Delage & Frauenfelder 2012, Garraffa & Grillo 2008).

Following Friedmann et al. (2009), we explain French children's difficulties with A'-dependencies headed by a [+NP] element in terms of RM intervention effects as illustrated in (5) above[6]. The specific structures that pose problems for our participants involve a particular featural set-relation represented as follows:

(27) Which cat   is the boy washing <which cat>?

<div align="right">(+NPObjEx-situ)</div>

    [+WH +NP]   [+NP]   [+WH +NP]

(28) The cat   that the boy is washing <the cat>.

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (+NPObjectRC)

$\quad$ [+R +NP]   [+NP]   [+R +NP]

Here we see that the element heading the A'-chain contains a [+NP] feature also present on the intervening subject. This featural similarity is the source of difficulty[7] because the child's system is endowed with weaker processing capacities. As shown in (27) and (28), the problematic relation is one of *inclusion*, where the features on the embedded subject are included in the set of features present on the moved *wh*-element and the relative head. In these cases, the relevant sets of features are [+WH +NP] and [+R +NP], with [+WH] and [+R] being the attractor features. In early grammar, the chain relation between the moved element and its trace is blocked by the intervening subject, whose [+NP] feature is contained in the features specifying the A'-moved object. In contrast, in-situ *wh*-questions and fronted [–NP] *wh*-questions do not give rise to such intervention effects. This illustrates the role of both the featural specification of the elements forming the A'-chain, as well as movement for the comprehension of A'-dependencies in French. In sum, [+/– movement; –intervention] configurations are easier than [+movement; +intervention] structures, confirming our first prediction[8].

As for *wh* in-situ questions, children are extremely accurate in their responses for both [–NP] and [+NP] object questions. This crucially sheds light on the analysis of *wh* in-situ in French. Children's high scores for questions with a [+NP] object in-situ argue in favour of featural movement in these configurations, and against a covert phrasal movement analysis involving pied-piping of the whole object DP (along the lines of Huang 1982). Under an RM approach, covert movement of the entire *wh*-phrase would predict the same results for the comprehension of [+NP] *wh* in-situ as for object questions with an overtly fronted [+NP] *wh*-word. Our study shows that this prediction is not borne out. A more plausible analysis for a question like (29) below implies movement only of the [+WH] feature on the *wh*-element in-situ (see Shlonsky 2012), rather than of the whole set of features present on the object DP *quel chat*.[9] This readily accounts for the absence of intervention effects in such cases, as the [+WH] feature undergoing movement enters into a disjunction configuration with the featural specification on the intervener:

(29) Le garçon lave   quel chat ?
$\qquad$ [+NP]   [(+WH)+NP]

Comparing across A'-dependencies, we observe that [+NP] object questions yield less accurate performance than [+NP] object RCs, despite both displaying a similar complexity level, i.e. they both involve movement and featural intervention. One way of capturing this asymmetry is in terms of *movement optionality*: French children have more difficulties comprehending fronted [+NP] object questions than [+NP] object RCs precisely because their grammar offers a competing alternative for the formation of interrogatives while it does not for RCs. Amongst the existing alternatives, children favor the more economical *wh* in-situ to the fronting of the *wh*-element because it circumvents RM effects by avoiding overtly crossing an intervening element, but this occurs somewhat at the expense of the more costly option during the initial stages. Recall that the preference for the non-movement option is also present in young children's early productions (Hamann 2000, 2006).

In contrast to *wh*-questions, RCs in French do not display movement optionality, but have instead a unique structural option available in the grammar. For structures that involve the same degree of complexity, the child system appears to cope better once there is no competing alternative which would be more economical and which s/he could have exploited instead. Cases where the input is unambiguous are then expected to be simpler than those where multiple options exist and for which children would have to appeal to principles of economy to decide amongst the different structures in the input (see also Zuckerman (2001) who uses the notions of optionality and economy to account for child production). That children would opt for the less complex option among the competing structures in production and show side-effects of this in comprehension follows from our second prediction. It further provides evidence in favour of a complexity scale in the comprehension of A'-dependencies in French, determined by the presence of competing options for *wh*-movement.

According to this complexity scale, the comprehension of *wh*-questions should improve with items containing ESK since this element only occurs with fronted *wh*-elements, thus erasing movement optionality. This prediction is upheld by our results, which reflect a tendency towards better performance in the presence of ESK. Note that, despite the presence of ESK, there is still a significant difference between [–NP] and [+NP] questions showing that the featural make-up of the *wh*-element plays an important role in comprehension.

Since the tendency for improvement did not reach statistical significance because there were only 2 items per condition in this study, we ran a short follow-up study with French-speaking children aged 5 years (Mean Age=5;2, Total number=19) and 6 years (Mean Age=6;4, Total

number=19). The experiment focused on the comprehension of object A'-
dependencies and included (among other structures) four items assessing
the role of ESK with fronted [+NP] *wh*-questions and four [+NP] object
RCs. The pictures and the linguistic stimuli used were similar to those of
the tasks reported in section 2.1 above. The results of this second study for
wh-questions with ESK are given in figure 7 below, alongside the relevant
findings from the first study:

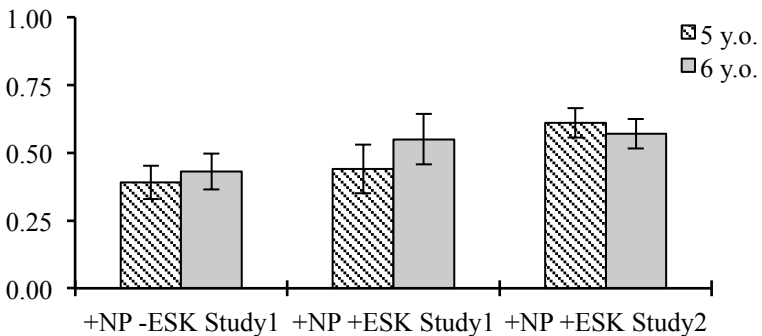Figure 7: Results for object -/+ESK questions across studies

Figure 7 shows that the tendency for improvement with ESK is
replicated in Study 2 and becomes more robust when compared to
questions that do not contain this element (t(73)=-3.003, p=.004). This
finding confirms the facilitating role played by ESK in comprehension, at
least for the 2 age groups tested in the follow-up study, and strikes a
contrast with reports for production where the insertion of ESK is
associated with a more complex level on the Derivational Complexity
Metric (Jakubowicz 2005, 2011). The observed asymmetry between
comprehension and production is not new. It has already been highlighted
for syntactic research by, for example, Gerken et al. (1990) who
investigated children's processing of function words, showing that
children experience difficulties in comprehending sentences which lack
function words even though they omit these in their productions. As
mentioned above, we interpret the improvement in comprehension attested
for questions with ESK in terms of optionality. Thus, the presence of ESK
erases the possibility for the *wh*-element to remain in-situ. Put differently,
if the presence of competing structural alternatives increases processing
difficulty, then we can explain why the insertion of ESK, erasing
optionality of movement, facilitates comprehension.

Such an approach also predicts that [+NP] *wh*-questions with ESK should yield performance that is on a par with [+NP] RCs. Unlike questions without ESK, which present the particularity of optional movement, these questions with ESK become similar in complexity to RCs since both involve obligatory movement as well as intervention effects. This syntactic parallelism should be reflected in parallel scores obtained by children. As mentioned above, the follow-up study that we ran with 5 and 6 year-old children also tested the comprehension of [+NP] object questions with ESK and [+NP] object RCs. We report the results in Figure 8. As can be seen, our prediction is borne out since both structures yield similar accuracy scores across the two age groups tested.

Figure 8: Mean correct answers for ex-situ object A'-dependencies
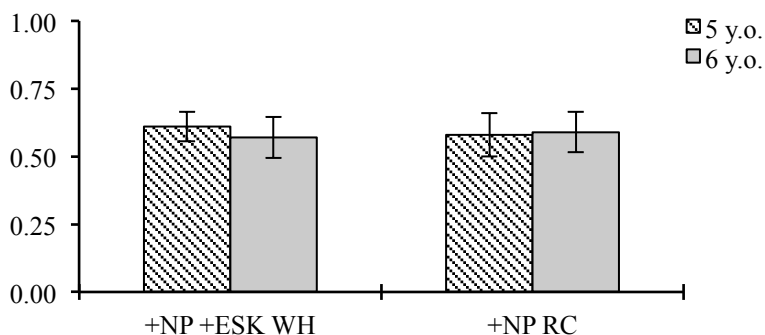
To summarize, we have provided an account for the comprehension of RCs and *wh*-questions in French that capitalizes on the interplay between movement, stricter intervention effects in child grammar surfacing in the context of movement, and structural optionality.

4. Conclusions

We began this study by asking what effect structural complexity has on the comprehension of A'-dependencies in French (*wh*-questions and relative clauses) and whether this effect is modulated by the specific features of the elements used to establish such dependencies. In particular we wanted to explore to what extent the existence of various strategies for *wh*-question formation influences French children's processing of object questions as compared to subject questions, on the one hand, and relative clauses, on the other hand. The findings for French show that children's performance

with the configurations tested follows a complexity hierarchy in which various factors are at play, in particular the presence or absence of an [NP] feature on the head of the A'-chain and the option of this element to move or remain in-situ. Children have most difficulties comprehending dependencies with a [+NP] A'-moved object. The easiest structures for comprehension are *wh* in-situ questions, regardless of the featural make-up of the *wh*-element, that is whether or not it is [–NP] or [+NP]. This shows that not all A'-dependencies are problematic for children, but only those in which an inclusion relation holds between the features of the element heading the A'-dependency and the intervener, namely the subject of the RC or of the *wh*-question. Moreover, it supports the idea that children, especially at a young age, prefer the most economical option provided by the target grammar. Children's better performance with [+NP] RCs than with [+NP] ex-situ questions also corroborates our hypothesis that complexity increases whenever competing structural options exist for a certain structure (i.e. a non-movement alternative for *wh*-questions) as opposed to configurations that do not manifest this optionality.

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Notes

[1] The position indicated in angled brackets represents the argument position where the displaced element *who* was merged in the structure.

[2] Following Rooryck (1994) we take *est-ce que* to be an unanalyzed question marker inserted under C°, i.e., it is a complex Q-complementizer, while C° is lexicalized by the verb in cases of inversion. See also Prévost (2009) for a more detailed discussion on the nature of *est-ce que*.

[3] Jakubowicz (2005) defines the Derivational Complexity Metric as follows:

    a. Merging α_i n times gives rise to a less complex derivation than merging α_i (n + 1) times.

    b. Internal Merge of α gives rise to a less complex derivation than Internal Merge of $\alpha + \beta$.

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[6] One reviewer notes that if intervention were a linear phenomenon, then the easiest aspect of in-situ structures is accountable in terms of lack of linearity problems with in-situ. It suffices to point out here that intervention is clearly determined on hierarchical and not linear grounds, as the asymmetry between (a) and (b) illustrates: (a) *What did **who** buy (b) **What** did the man **who** likes Mary buy? Here we have the same linear orders between the wh-elements, but a different syntactic organization between them which explains the locality violations surfacing in (a) but not in (b). The fact that children are sensitive to structural rather than linear constraints has also been noted in the literature (see e.g. Crain & Nakayama 1987).
[7] It is worth underlining that the relevant notion which can account for the asymmetry found with these A'-chains appears to be that of syntactic lexical restriction (i.e. the [+NP] feature) rather than that of semantic D(iscourse)-Linking. In the given experimental situation both *who* and *which*-object question are D-linked in the same way, as the discourse context is provided by the pictures.
[8] Friedmann and Costa (2010) bring further evidence in favour of a stricter role played by intervention over wh-movement. They report the findings of a series of experiments with Hebrew- and European-Portuguese-speaking children aged 3;5 to 5;6. The experiments investigated the comprehension of subject and object RCs and of coordination structures with or without a crossing dependency. Their results reveal a similar pattern of performance for both object RCs and coordination with crossing dependencies, showing that children have difficulties not just with wh-movement, but in general with dependencies involving an argument moving across another argument.
[9] One reviewer points out that such an analysis predicts that intervention effects should also appear with covert movement. Indeed, Pesetsky (2000) argues that feature movement differs from phrasal movement in that the former is sensitive to intervention effects. This explains the ungrammaticality of (ii) compared to (i):

    (i) Which book did which student read?
    (ii) *Which book didn't which student read?

Pesetsky (2000) argues that movement of the formal feature of *which student* in (ii) is blocked since there is an intervening negation. In other words, feature movement is sensitive to interveners such as negation.