

Person Matters: Relative Clauses in the Acquisition of French

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Abstract

Children's comprehension difficulties with object relative clauses (ORs) seem reduced when the embedded subject is a pronoun, rather than a lexical noun. The intervention locality account explains this facilitation in terms of a mismatch in features between the head of the OR and the intervening pronominal subject, namely the N feature according to some (Friedmann et al. 2009), or finer-grained phi features according to others (Bentea & Durrleman, 2021). We evaluate the predictions of these accounts in an experimental study assessing OR comprehension in French. Fifty-two children between the ages of four and five were tested on a character-selection task investigating whether intervention effects in ORs with a lexically-restricted object are alleviated, or not, with pronominal interveners matching with the object in other features than lexical restriction. We also explored the potential impact of an intervening pronominal mismatching with the object on a feature yet unexplored in French, namely person. Results reveal low performance on

ORs with pronominal interveners matching on features (number, gender, person). However, ORs with pronominal interveners mismatching only in person were comprehended significantly better. This suggests that differences in finer-grained features than N explain children’s difficulties with ORs and that person is such a feature.

Keywords: relative clauses; intervention; pronouns; acquisition; person feature; French.

1. Introduction

A consistent finding for the acquisition of relative clauses across languages is that subject relatives (SRs) as in (1) are easier for children to comprehend and produce and are thus mastered early in development, while object relatives (ORs) such as those exemplified in (2) pose more difficulties for children, both in comprehension and production (Arnon 2005, 2010, Adani, van der Lely, Forgiarini, & Guasti 2010, Belletti, Friedmann, Brunato, & Rizzi 2012, Bentea, Durrleman, & Rizzi 2016, Costa, Lobo, & Silva 2011, Friedmann, Belletti, & Rizzi 2009).

- (1) Show me *the boy* that <the boy> is hugging the grandfather.
 (2) Show me *the boy* that the grandfather is hugging <the boy> .

The angled brackets in examples (1) and (2) indicate the position (or the gap) inside the relative clause from which the head noun (*the boy*), i.e. the noun phrase (NP) modified by the relative clause, is moved and from which it is subsequently deleted at spell-out. In (1), movement takes place from the subject position of the embedded verb, thus creating a subject dependency between the head noun and the gap. The dependency between the head and the gap in (2) is an object dependency because the gap appears in the object position of the embedded verb. While it looks like the difficulty with ORs is determined by the length of movement, since the subject dependency in (1) is created through shorter movement than the object dependency in (2), it has been observed that certain long dependencies that also involve longer movement are easier for children to comprehend (Friedmann et al. 2009, Costa, Grillo, & Lobo 2012). This is the case for ‘free’ ORs exemplified in (3) in which the relative head does not contain a nominal +N part, contrary to headed ORs (2) .

- (3) Show me *who* the grandfather is hugging ___ .

The difficulty with ORs as in (2) has been captured in terms of similarity in the lexical N restriction between the OR head and the intervening subject (Friedmann et al. 2009). While in headed ORs both the moved object *the boy* and the intervening subject *the grandfather* share the same +N feature, the wh-quantifier *who* in a free relative is specified for a +Q (interrogative) feature and does not contain such a lexical restriction. This is represented in (4a) and (4b) below:

- (4) a. [+R+N] [+N] [+R+N]
 Show me *the boy* that the grandfather is hugging <the boy> .
 b. [+Q] [+N] [+Q]
 Show me *who* the grandfather is hugging <who> .

A mismatch in the +N feature thus appears to lead to better comprehension for structures in (4a) relative to structures in (4b), while a similarity in this feature gives rise to *intervention effects* (Belletti et al. 2012, Friedmann et al. 2009) along the lines of those captured by the principle of Relativised Minimality (RM). This postulates that the dependency between the moved element (X) and the gap (Y) cannot hold if there is a hierarchical intervener (Z) which is of the same type as X, where ‘same type’ refers to sharing the same morphosyntactic features (Rizzi, 1990, 2004, Starke 2001).

(5) X ... Z ... <Y>

In fact, this articulation in terms of ‘same structural type’ initially referred to interveners with an identical featural overlap with the head of the dependency, and served to rule out structures which are inaccessible to both adults and children. These are ungrammatical sentences (marked with an asterisk) such as (6), in which the identical +Q feature is present on both the fronted wh-element *what* and the intervening subject *who*.

(6) [+Q] [+Q] [+Q]
**What* do you wonder *who* is hugging <*what*>?

In contrast, a disjunction of features between the head X and the intervener Z facilitates comprehension, as is the case with free ORs such as in (3)/(4b). Where adults and children differ is for (2)/(4a), where the set relation is that of inclusion, i.e. the features of the intervener Z are included in the featural specification of the target X. More specifically, for young children, the mere inclusion of the lexical +N feature on the head *the boy* when it is also present on the intervening subject *the grandfather* makes the structure in headed ORs too difficult for them to understand. Adults do understand these structures, however it is worth noting that fine-grained methods that move beyond offline comprehension to reading times, nevertheless reveal that such structures are harder than the others including for adults (see for example Gordon, Hendrick & Johnson 2004).

Crucially for the current work, various studies have shown that the difficulty with ORs involving lexical restrictions can be reduced when certain more fine-grained features than +N are mismatched (Adani et al. 2010, Belletti et al. 2012). For example, a mismatch in number between the lexically restricted head of the relative and the embedded lexically restricted subject (7) improves comprehension of ORs. This facilitation has been attested for Italian-speaking children, in work by Arosio, Guasti & Stucchi (2011) and Adani et al. (2010) for children from five and up to nine years of age, but also for six to eight year-old French-speaking children in work by Bentea & Durrleman 2017, 2021).

(7) [+R, +N, +PI] [+N, +Sg] [+R, +N, +PI]
Show me *the boys* that the grandfather is hugging <*the boys*>.

Similarly, the effect of gender mismatch (8) plays a role in children’s comprehension of ORs, although this role varies cross-linguistically.

- (8) [+R, +N, +Masc] [+N, +Fem] [+R, +N, +Masc]
 Show me *the boy* that the grandmother is hugging <the boy>.

Belletti et al. (2012) show that in Hebrew, a gender mismatch between the OR head and the intervening subject sharply improves comprehension, while this same mismatch does not significantly affect comprehension in Italian. Therefore, the authors conclude that gender *per se* has no effect on comprehension, and they explain this as a consequence of the fact that the verb agrees in gender with the subject in Hebrew, but not in Italian. In light of this, what would make a feature relevant for locality is the fact that it is part of the feature set that triggers movement of the subject, by being morphologically expressed in the inflection of the finite tensed verb.

These findings have led to an enrichment of what we understand about intervention effects in child grammar and of the distinctions in terms of set-theoretic relations that the child grammatical system allows. This is summarized in (9) following Belletti et al. (2012: 1063):

	Intervener				
	X	Z	Y	Adults	Children
Identity	A	A	<A>	*	*
Inclusion	A,B	B	<A,B>	ok	*
Intersection	A,C	C,D	<A,C>	ok	ok
Disjunction	A	B	<A>	ok	ok

Children show good performance not only with disjunction, but also with intersection relations, so essentially relations in which the intervener differs from the moved object in at least one relevant feature, as in the case for gender in Hebrew. Children have more difficulties with identity and inclusion configurations. Inclusion is triggered by the +N feature, while intersection is created by mismatches in finer-grained features, provided these are among the features triggering movement (Friedmann, Rizzi, & Belletti 2017).

With this work, we ask whether both of these relations, inclusion and intersection, can be captured by finer-grained features, and as such studies that have looked at the effect of pronouns on the comprehension of relative clauses become crucial. While some studies have shown that the presence of a pronoun as intervening subject improves OR comprehension (Arnon 2010, Friedmann et al. 2009, Kidd, Brandt, Lieven, & Tomasello 2007) and production (Hamann & Tuller 2015), other studies report no facilitatory effects (Haendler, Kliegel & Adani 2015). Looking closely at these studies, when a facilitation has been observed, it does not seem necessary to appeal to the presence versus absence of a lexical N to account for children's improved performance, because finer-grained features would already predict this outcome. Considering first Friedmann et al. (2009), their study assessed the comprehension of ORs in Hebrew in which the pronominal element appearing in subject position was a null pronoun with an arbitrary interpretation. This impersonal *pro* subject in Hebrew triggers plural agreement on the embedded verb *brush* head, as the glosses in (10) indicate, and therefore mismatches in the number feature with the OR head.

- (10) Tare li et ha-sus she- mesarkim oto.
 show to-me ACC the-horse that-*pro*-brush.PL.MASC him
 ‘Show me the horse that they are brushing.’

The finer-grained featural mismatch in number was therefore present in addition to the difference in lexical N, and thus could itself have sufficed to facilitate comprehension of ORs with a pronominal subject. Similarly, the improvement reported by Arnon (2010) for Hebrew in a sentence comprehension task and by Kidd et al. (2007) for English in a sentence-repetition task was for structures where the intervening pronoun differed in the person feature: a 1st person pronoun in Arnon (2010) and a 2nd person pronoun in Kidd et al. (2007)¹. If the head of the object dependency and the intervening subject already differ on phi-features, we would expect OR comprehension to improve regardless of whether or not an inclusion relation created by the +N feature holds between the two constituents, because the mismatch in phi-features gives rise to an intersection relation. Hence it is not entirely clear that N itself would be necessary to account for the observed facilitation with pronominal interveners. Finally, the study by Haendler et al. (2015) suggested that children’s performance with ORs in German does not improve when the intervening pronominal subject matches the head noun on features like number and person. Taken together, these findings indicate that difficulty with ORs also emerges in structures in which the moved object and intervening subject mismatch in the lexical N feature, but match on phi-features (see also Bentea et al. 2016) Bentea & Durrleman 2021).

With this in mind, the current study investigated whether intervention effects (inclusion) in French-speaking children can be triggered in the absence of a match in N feature between the OR head and the (pronominal) intervener, provided all other relevant features are maintained constant. If lexical N impacts comprehension, then we expect comprehension of headed ORs with a lexically-restricted subject to be lower than comprehension of ORs with a pronominal subject. However, if finer-grained features than lexical N can suffice to trigger intervention effects, then we expect that intervening pronominal subjects matched on all phi features will not yield better performance than lexically restricted subjects. On the other hand, a mismatch on a fine-grained feature, such as person, would facilitate comprehension.

The relevance of person as an overtly marked grammatical feature for the computation of locality follows from the line of reasoning put forth in Belletti et al. (2012) and according to which only features morphologically expressed in the inflection of the finite tensed verb are taken into account in the calculation of locality. Indeed, in French, the finite verb shows person agreement with the subject, similarly to gender agreement in Hebrew. Furthermore, there seems to be syntactic evidence for the special treatment in the syntax of 1st and 2nd person vs. 3rd person pronouns. For example, Bianchi (2006) assumes, on the basis of the Person-Case Constraint in Romance languages (which determines ordering restrictions in clitic sequences), that

¹ It is worth noting that the use of 1st and 2nd person pronominal subjects also facilitate processing of ORs in adults (see Gibson (2000), Warren and Gibson (2002), Gordon et al. (2004)). Similarly, Carminati (2005) shows that the resolution of the Italian null subject pronoun (*pro*) in adult on-line processing is facilitated when *pro* is disambiguated by 1st and 2nd person features compared to 3rd person features.

there is a relative ranking of person features and that there are different functional person heads against which all pronominal arguments must license their person feature. In this view, third person is projected in a separate and lower head than first and second person. Silverstein (1985) also observes that 3rd person pronouns share similar features to lexical nouns (e.g. animacy, gender) and goes on to argue that 3rd person pronouns are pronominalised lexical determiner phrases (DPs) which maintain the lexical properties of the underlying nominal expression. This further strengthens the idea that 3rd person pronominal subjects, when specified for matching features with the moved lexical OR head, can lead to an inclusion configuration that is difficult for children to compute. In contrast 2nd person pronouns would be expected to create an intersection configuration and thus facilitate parsing.

2. Method

2.1. Participants

A group of fifty-two children (twenty-seven girls and twenty-five boys) took part in the study. Children were aged between 4;4 and 5;6 (mean age/MA = 58.2 months, standard deviation/SD = 3.68 months) and were recruited in primary schools in the area of Geneva in Switzerland. There were thirty-five 4-year-old children (age range 4;4 – 4;11, MA = 55.9 months, SD = 1.97 months) and seventeen 5-year-old children (age range 5;0 – 5;6, MA = 62.6 months, SD = 1.45 months). The children had no hearing, language or other cognitive impairments. The study was approved by the relevant board of the Département de l'Instruction Publique (Department of Public Instruction) responsible for the public school sector in the canton of Geneva and, prior to testing, parental consent was obtained for the children's participation. The experimental material was piloted with a small group of children and adults.

2.2. Linguistic stimuli

We assessed children's comprehension of both SRs and ORs in French. While SRs (11) contained two lexical nouns, in ORs the head noun (i.e. the moved object) was always a lexical noun and the intervening subject varied between *i.* a lexical noun (12), *ii.* a 3rd-person pronoun (13), and *iii.* a 1st-person pronoun (14).

SRs with two lexical NPs

- (11) Montre-moi la chenille qui arrose la souris.
 show-3SG-ME the.FEM.SG caterpillar that splashes the.FEM.SG mouse
 'Show me the caterpillar that is splashing the mouse.'

ORs with a lexical NP subject

- (12) Montre-moi la chenille que la souris arrose.
 show-3SG-ME the.FEM.SG caterpillar that the.FEM.SG mouse splashes
 'Show me the caterpillar that the mouse is splashing.'

ORs with a 3rd person pronoun subject

- (13) Montre-moi la chenille qu'=elle arrose.
 show-3SG-ME the.FEM.SG caterpillar that=she splashes
 'Show me the caterpillar that she is splashing.'

ORs with a 1st person pronoun subject

- (14) Montre-moi la grand-mère que j'=arrose.
 show-3SG-ME the.F.SG grandmother that I=splash
 'Show me the grandmother that I am splashing.'

For each of these relative clause types we constructed ten items, for a total of forty test items. The subject and the object phrases in all the items matched in Gender and Number features, as these were always Feminine (F) and Singular (SG). In the ORs containing a 1st person pronoun as embedded subject, this feature matching was achieved by using a feminine referent ('Belle' the pony). The object head and the intervening subject in this type of OR differed only with respect to the Person feature (3rd person for the OR head vs 1st person for the pronominal subject). The head noun (*la chenille* / "the caterpillar") and the embedded subject (*la souris* / "the mouse"; *elle* / "she") always matched in Person feature in the other two OR types. We chose to use the 3rd person feminine pronoun *elle* as intervening subject instead of the masculine pronoun *il*, because in this case the elision of *e* in the complementizer *que* as in (15) would give rise to the form *qu'il*, which could be confounded with *qui* (the complementizer introducing a SR).

- (15) Montre-moi le lapin qu'=il arrose.
 show-3SG-ME the.M.SG rabbit that=he splashes
 'Show me the rabbit that he is splashing.'

In addition to the forty test trials, the experiment also included 20 fillers. These were either simple *who*-questions like *Who is pushing the grandfather?* or simple sentences like *Show me the fox*. The purpose of the fillers was to make sure that children were paying attention to the task.

2.3. Procedure

Children were tested individually in a quiet room at their school. The task was administered on laptops as a PowerPoint presentation. The stimuli were pre-recorded by a female French native speaker and the audio integrated into the presentation. The presentation of the images was manually controlled by the experimenter, who advanced from one trial to the next only after the child answered the trial and her response was noted down on a response sheet. The task began with the experimenter familiarizing the child with Belle, the unicorn puppet who interacted with the child throughout the task and whose image was associated with the referent of the 1st-person pronominal subject.

In the introduction to the task, children first saw Belle's image on the screen and heard a recording in which Belle introduced herself and explained the task. This was presented as a game in which children had to guess the correct answer while looking at images of Belle and other characters engaging in different actions with various people and animals. Belle acted as the story teller for the whole task and her voice was used to present all the items. This rendered the use of a 1st-person pronoun in the corresponding trials pragmatically felicitous (see Figure 2)².

² One anonymous reviewer suggests that the use of the character "Belle the pony" might have introduced a 'fun' factor for the items with the "je" pronoun, thus making children more

Each trial was preceded by a preamble that introduced the characters in the image and included three characters that were performing one action with reversed Agent-Patient roles. For example, the preamble for Figure 1 was *Look! Here we see a mouse*. This identified the character in the middle and made it more salient in the discourse, as well as helped establish it as referent of the 3rd person pronoun that appeared in the following test item (see example (13) above). Similar images assessed comprehension of subject and object relative clauses in which full lexical nouns were used to identify the subject and the object. In this case, the preamble would be *Here are two caterpillars and a mouse*, which was then followed by a sentence like in (11) and (12). The preamble for images as in Figure 2, where Belle appeared as middle character, would commence with : *And here it's me*. The test sentences with a 1st person pronoun subject (14) then followed. These preambles thus allowed us to relate the pronouns in the test items, *elle* (she) and *je* (I), to a discourse referent.

Figure 1. Example of images used to assess comprehension of object relative clauses with a 3rd-person pronoun subject.



Source: Image created using Clipart pictures

Figure 2. Example of images used to assess comprehension of object relative clauses with a 1st-person pronoun subject.



Source: Image created using Clipart pictures

The characters on the left- and right-side of the images corresponding to the trial items were always of the same type (e.g., girls), while the filler trials contained three different characters. The middle character in the test trials containing a 1st-person

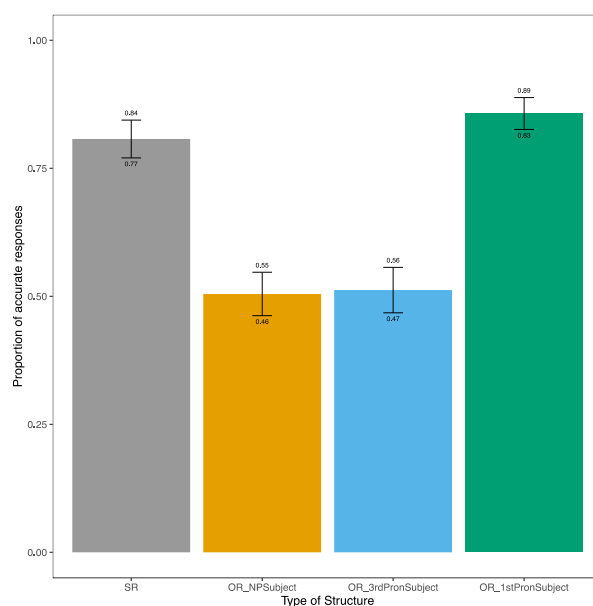
likely to assign the correct pronoun interpretation compared to the items with a 3rd person pronoun as subject. However, children saw the puppet next to them on the table throughout the whole duration of the task. Moreover, the fact that children comprehend SRs as in (11) on a par with the items containing *je* suggests that their performance is not boosted by the presence of a fun character as pronominal referent.

pronoun was always Belle the pony. The correct answers for the test trial targeted one of the characters on the left- or right-side of the image, while the correct answers for the filler trials always targeted the middle character. In half of the test trials, the direction of the action was from left to right, in the other half the direction was from right to left. We created two lists in which the items were pseudo-randomized: both lists contained all the items, but in different orders, such that no two items from the same condition appeared one after the other. Half of the children saw the first list and the other half the second list. The whole task lasted approximately 20 minutes and, if children wanted to, they could take a break halfway through the task. Children received colorful stickers at the end of the task as a gift for taking part in the study. They were generally very engaged and enjoyed playing the guessing game with Belle the pony.

3. Results

We calculated children's response accuracy for each of the structures indicated in (6 to 9) above. Answers to the test items were counted as correct if the child pointed to the character corresponding to the RC head, and incorrect if the child pointed either to the competing/distractor character or to the middle character. Out of the total of fifty-two children tested, three children were excluded from the final analysis because of their low response accuracy rates to both the filler items (between 50% and 60% accuracy) and the SR items (between 20% and 30% accuracy). The group of forty-nine children included in the final analysis were very accurate for the fillers (mean response accuracy 96%). Figure 3 indicates the proportion of correct responses for the test items (SRs as well as ORs with a lexical NP subject, a 3rd person pronoun, and a 1st person pronoun as embedded subject). Children were most accurate with SRs (81%) and ORs with a 1st person pronominal intervener (86%), whereas they were less accurate with ORs containing a full lexical NP subject (50%) and ORs with a 3rd person pronoun as subject (51%).

Figure 3. Proportion of correct responses for subject and object relatives, with 95% confidence intervals



The accuracy data were analyzed with a generalized linear mixed-effects model (Baayen, Davidson, & Bates 2008; Jaeger 2008). The statistical analysis was performed in the R environment (R Core Team 2021), employing the *lme4* package version 1.1-28 (Bates, Mächler, Bolker, & Walker 2015; Bates, Maechler, Bolker, Walker, Christensen, Singmann, Dai, Scheipl, Grothendieck 2022). Planned comparison, when justified were performed using the *emmeans* package version 1.7.2. (Lenth, Buerkner, Herve, Love, Miguez, Riebl, & Singmann 2022). The binary dependent variable was correct or incorrect answer, coded as 1 and 0 respectively. The fixed effect structure included Type of Structure and Age Group, as well as their interaction. Both fixed effects were coded using sliding contrast coding. This contrast coding compares the mean of the dependent variable on one level of a factor to the mean of the previous level. In our analysis the following factor levels were compared for Type of Structure: ORs with an NP subject (OR_NP) versus SRs, ORs with a 3rd person pronoun (OR_3rdPron) versus OR_NP and ORs with a 1st person pronoun (OR_1stPron) versus OR_3rdPron. For Age we compared the 4-year-old group to the 5-year-old group. The random effect structure included random intercepts by participant and item, as well as random slopes for Type of Structure by participant. Table 1 summarizes the fixed effect structure of the model.

Table 1. Summary of the fixed effects of the generalised mixed-effects model. Significant effects are indicated in bold.

Effect	Coeff.	Std. Error	z-value	p-value
Intercept	1.29	.19	6.78	<.001
OR_NP vs. SR	-1.53	.32	-4.80	<.001
OR_3 rd Pron vs. OR_NP	-0.07	.28	-0.26	.787
OR_1stPron vs. OR_3rdPron	3.11	.47	6.59	<.001
5yo vs. 4yo	.60	.32	1.83	.066
OR_NP vs. SR : 5yo vs. 4yo	.93	.46	2.01	.044
OR_3 rd Pron vs. OR_NP : 5yo vs. 4yo	-0.70	.40	-1.72	.085
OR_1stPron vs. OR_3rdPron : 5yo vs. 4yo	1.05	.70	1.50	.133

The comparison between ORs with a full lexical NP subject and SRs confirmed the well-attested subject > object asymmetry in the comprehension of relative clauses containing two lexical nouns: children were significantly less accurate with OR_NP structures than with SRs ($\beta=-1.53$, $SE=.32$, $z=-4.80$, $p<.001$). The comparison between ORs with distinct embedded subjects revealed, on the one hand, no significant difference in performance between OR_NP and OR_3rdPron structures. In other words, children comprehend ORs with a full lexical NP and ORs with a 3rd person pronoun subject (*elle*) on a par ($\beta=-.07$, $SE=.28$, $z=-.26$, $p=.787$). On the other hand, the comparison showed a significant difference in performance with ORs containing pronominal interveners: children were significantly more accurate in the comprehension of ORs with a 1st person pronoun subject (*je*) compared to ORs with a 3rd person pronoun subject ($\beta=2.06$, $SE=.25$, $z=.15$, $p<.001$). The main effect of Age Group was not significant ($p=.066$), but there was a significant interaction between Type of Structure and Age Group with respect to the SR – OR with full lexical subject comparison (*OR_NP vs. SR* × *5yo vs. 4yo*; $\beta=.93$, $SE=.46$, $z=2.01$, $p=.044$). Planned comparison revealed that this interaction is driven by the fact that the 4-year-old group

is significantly less accurate than the 5-year-old group in the comprehension of ORs with a full lexical NP ($\beta=-.92$, $SE=.29$, $z=-3.15$, $p<.001$), while there is no difference in performance between the two groups in the comprehension of SRs ($\beta=.01$, $SE=.38$, $z=.03$, $p=.973$).

4. Discussion

This study aimed to uncover whether intervention effects in ORs in French can be triggered even when the OR head and the pronominal subject intervener mismatch in lexical restriction, provided all other relevant features are maintained constant. We therefore compared comprehension of three types of object relative clauses: (i) ORs with a full NP subject matching in lexical restriction with the relative head (i.e. the moved object); (ii) ORs with a 3rd person pronominal subject which shared the same phi-features (i.e. gender, number, person) with the relative head, but mismatched in lexical restriction; and (iii) ORs with a 1st person pronominal intervener differing from the fronted lexically-restricted head on a feature yet unexplored in French, namely person. We also included SRs in the study in order to establish whether the subject – object asymmetry previously attested for comprehension also holds for children’s performance with ORs containing an embedded pronominal subject.

For these object dependencies, one approach of the intervention locality account (Grillo 2009; Friedmann et al. 2009; Belletti et al. 2012; Belletti & Rizzi 2013; Rizzi 2013, 2018) predicts no intervention effects for comprehension once the head noun and the intervener differ with respect to lexical restriction. In other words, any type of pronoun in the embedded subject position should improve comprehension, because all personal pronouns lack a lexical N restriction. However, another approach (Bentea & Durrleman 2021; Durrleman & Bentea 2021) has suggested that the computation of locality is concerned with finer-grained phi-features than lexical N, and thus pronouns matched on these features should not give rise to better performance. Indeed, the facilitation observed in Friedmann et al. (2009) could be due to a mismatch in the number feature between the OR head, which was singular, and the embedded arbitrary pronoun, which was plural (Haendler et al. 2015, Haendler & Adani 2018)). In the current study, we controlled for the possibility that mismatches other than in lexical restriction affect the comprehension of ORs with a 3rd person subject pronoun and we also assessed whether a mismatch in the person feature facilitates comprehension of ORs with pronominal interveners.

The results confirm the poor performance often reported for ORs containing a fronted lexically-restricted object and an intervening lexically-restricted subject compared to SRs (Arnon 2005, 2010, Adani et al. 2010, Belletti et al. 2012, Friedmann, Belletti, & Rizzi 2009, Friedmann et al. 2009). Moreover, we observe that ORs with a 3rd person subject pronoun are equally difficult for comprehension as ORs with a full lexical subject, a finding which is not in line with an approach whereby intervention locality is captured only in terms of presence or absence of a lexical N. These findings indicate that ORs with pronominal interveners also give rise to an inclusion relation precisely because the two constituents, the target (the moved object) and the intervener (the subject), match in other morphosyntactic features like person and number.

- (16) [+R, +N, +3rd pers, +Sg] [+3rd pers, +Sg] [+R, +N, +3rd pers, +Sg]
 Montre-moi *la chenille* qu’ elle arrose <*la chenille*>.
 ‘Show me the caterpillar that she is splashing.’

This highlights the role that finer grained features than N play in the computation of intervention effects. Indeed, when the intervener does not contain a lexical restriction, as in this study and in work by Haendler et al. (2015) for German, but also when the head is not lexically-restricted, as in studies on RCs in French headed by the demonstrative pronoun *celui/celle* (Bentea et al., 2016; Bentea & Durrleman, 2021), we observe the same difficulty in comprehension because of the matching phi-features associated with both the head of the object dependency and the embedded subject. However, when the object and subject mismatch in Person features, as in RCs with *je* as the subject, comprehension improves significantly.

- (17) [+R, +N, +3rd pers, +Sg] [+1st pers, +Sg] [+R, +N, +3rd pers, +Sg]
 Montre-moi *la grand-mère* que j' arrose < *la grand-mère* >.
 'Show me the grand-mother that I am splashing.'

Looking more closely at the featural specification of the target and the intervener in (17), compared to (16), we notice that the phi-features on the two elements create an intersection relation, which is easy for children to compute. The asymmetry in performance between ORs with different pronominal interveners (3rd person pronoun vs 1st person pronoun) therefore suggests that lexical N restriction is not necessary to trigger locality effects. This is also in line with previous studies that have reported improved performance with ORs only when the pronominal head differed from the lexically-restricted subject intervener on fine-grained features like number (Bentea & Durrleman 2021), thus leading to intersection relations between the target and the intervener. Taken together, such findings suggest that the computation of locality is more fine-grained than N, and occurs at the level of nominal phi-features such as Number and Person, which are also specified on the finite verbal inflection.

The natural questions that arise is what distinguishes children from adults and when children become adult-like in their comprehension of restricted ORs and in their ability to compute the finer-grained distinctions in features which would allow them to accept A'-dependencies in which the target and the intervener share similar phi-features. First, it is worth noting that much online experimental work in psycholinguistics has shown that structures instantiating an inclusion relation are harder to process than those instantiating an intersection or a disjunction relation (Gordon, Hendrick & Johnson 2001, 2004). Therefore, the difficulty with these structures can also be detected in adults when analyzing the ease with which such configurations are computed in real-time. The syntactic complexity of ORs has been argued to put a burden on memory resources in the adult system (van Dyke and McElree 2006, 2011). Furthermore, Garraffa and Grillo (2008) and Grillo (2009) argue that the comprehension difficulties that agrammatic speakers experience with structures involving syntactic movement, like ORs, stem from their limited processing abilities which do not allow them to manipulate the complete array of phi-features in their syntactic representations. In a similar vein, the computation of the full array of morphosyntactic features required to distinguish the moved object from the intervener in ORs could be difficult to process for the children. Various studies have highlighted a link between accuracy on complex structures and verbal working memory in typically-developing (TD) children and children with developmental language disorders (DLD) (Delage & Frauenfelder 2019; 2020) and these links have moreover

specifically been identified for relative clauses, again in both TD (Bentea et al. 2016, Haendler et al. 2015) and DLD (Frizelle & Fletcher, 2015). As such, it could be hypothesized that the computations involved in complex sentences like relative clauses solicit more verbal working memory capacities. Once these capacities mature, adult patterns of performance would also be expected to emerge.

5. Conclusions

With this study we have shown that comprehension difficulties with object relative clauses stem from intervention effects which are also present when pronominal elements, lacking a lexical N restriction, match in morphosyntactic features with a full lexical N. Intervention is computed on a more fine-grained level than N, namely on features like number or person. In sum, both inclusion and intersection relations are established on the basis of the same phi features.

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