

Object Relative Clause Comprehension in L2 Children with Limited L2 Exposure

Maureen Scheidnes and Leslie Redmond

1. Introduction

There is a rich literature on subject-object asymmetries in the acquisition of relative clauses in monolingual children. Since Friedmann, Belletti and Rizzi's (2009) study on young typically developing (TD) children, work on relative clause acquisition has focused on the role of so-called intervention effects in explaining the difficulty with object relative clauses (henceforth, ORCs, as in (1)), compared to subject relative clauses (2) (SRC).

(1) ORC: Show me the boy that the girl is pushing ____

(2) SRC: Show me the boy that ____ is pushing the girl

Subsequent work has largely supported Friedmann et al.'s initial hypothesis, namely, that similarities between the head of the object relative clause (*the boy* in (1)) and the embedded subject (*the girl* in (1), i.e., the intervener) lead to weak ORC performance in young TD children (Adani, Stegenwallner-Schütz, & Niesel, 2017; Adani, van der Lely, Forgiarini, & Guasti, 2010; Bentea & Durrleman, 2018; Bentea, Durrleman, & Rizzi, 2016; Contemori & Belletti, 2014; Contemori & Marinis, 2014). Moreover, work on individuals with developmental language disorder (DLD) suggests that these learners can experience long-lasting difficulties with such structures (Adani, Forgiarini, Guasti, & Lely, 2014; Friedmann & Novogrodsky, 2011).

Compared to the work on monolingual children's acquisition of relative clauses, there are very few studies on the development of these structures in bilingual children. The current paper thus seeks to fill this gap through the examination of the comprehension of ORCs like (1) in sequential bilingual

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children (henceforth, L2 children). Given the importance of identifying DLD in bilingual populations and the challenge that variation in language exposure presents to this endeavor (e.g., Thordardottir & Brandeker, 2013), we focus on L2 children with very limited cumulative exposure to the L2 compared to the L1. This focus will allow us to see whether object relative clauses, which are mastered late in L1 acquisition, are also acquired late (i.e., after considerable L2 exposure) in L2 children, or whether a different pattern emerges.

2. Theoretical background

2.1. Intervention effects in relative clause development

Results from a series of experiments involving 3- to 5-year-old TD children acquiring Hebrew led Friedmann et al. (2009) to conclude that the particular difficulty with headed object relative clauses (as in (1)), as opposed to SRCs or headless ORCs, was linked to similarities between the embedded subject (i.e., the intervener) and the relativized object (see also Grillo, 2009). Based on principles of Relativized Minimality (Rizzi, 1990), Friedmann et al. defined this similarity in terms of a lexical restriction. In other words, an intervention effect arises when both the embedded subject and relativized object are full noun phrases (i.e., having the feature [+NP]). According to their account, in such a configuration, the embedded subject is taken as a potential candidate for the dependency between the relativized object and its trace, thus leading to difficulty parsing the structure.

Because Friedmann et al. (2009) observed chance performance on sentences like (1) in young children, a pattern not observed in adults, they hypothesized that sensitivity to intervention effects decreases with age. Subsequent work on ORCs in other languages revealed similar patterns, while at the same time leading to increased insight about the featural properties involved in the intervention effect (e.g., Adani et al., 2010; Belletti, Friedmann, Brunato, & Rizzi, 2012). Recent work has also included older children. For example, Contemori and Marinis (2014) found that L1 English-speaking children aged 6;0-9;0 performed significantly weaker on sentences like (1) compared to monolingual adults. Furthermore, in a study on the comprehension of ORCs and *which* object questions, a structure also involving an A-bar dependency, only 31 of the 61 monolingual French-speaking children aged 4;9-11;10 performed above chance on *which* object questions in which both DPs were animate and lexically restricted (Bentea et al., 2016). Taken together, this research suggests that while the frequency of chance performance decreases after age 5, structures with interveners lead to considerable variability in performance in school-aged children.

Moreover, studies on individuals with developmental language disorder (DLD) have revealed persistent difficulties in the comprehension and production of structures involving interveners (see Adani et al., 2014 for a review). Friedman and Novogrodsky (2011) examined the comprehension of subject and object *who*

and *which* questions in Hebrew-speaking children with DLD¹ aged 9;3-12;0. Object *which* questions. The children with DLD, who were much older than the TD children in Friedmann et al. (2009), had chance performance on the object *which* questions, thus suggesting that sensitivity to intervention effects is persistent in this population. Furthermore, in a study on English-speaking children with DLD² (mean age 12;11), affected individuals had significantly lower scores on all types of relative clauses compared to age-matches (Adani et al., 2014).

2.2. Frequency effects in L1 acquisition of relative clauses

While there is considerable evidence for the role of intervention effects in explaining the delay in object relative clauses, other work suggests that the frequency of structures like (1) in the input that children are exposed to plays an important role. Diessel and Tomasello (2000) hypothesized that the frequency of presentational subject relatives in child directed speech were in part responsible for their early emergence young English-speaking children. In a study on sentence repetition, English-speaking children (aged 3;1 - 4;9) correctly repeated ORCs with an inanimate head and an embedded subject pronoun (as in (2)), which are more frequent than ORCs with two animate heads in the input that children are exposed to (Kidd et al., 2007). These results suggest that the relative lower frequency of structure types like (1) compared to (3) has an important role to play in explaining the subject-object asymmetry.

(3) There is the book that you read in the front room last night.

Adani et al. (2017) compared predictions based on intervention effects against those based on frequency effects in a study on relative clauses in 3-5-year-old monolingual German-speaking children. Prior work on intervention effects had shown that number mismatches between the intervener and head led to a facilitation effect in comprehending ORCs (Adani et al., 2010). Based on a corpus analysis of child directed speech in German, Adani et al. (2017) concluded that ORCs with DPs that match in number are more frequent than those with number mismatches. Furthermore, they observed that object relative clauses with an animacy mismatch (i.e., inanimate head and animate noun in the embedded subject position) are more frequent than those with two animate DPs. Thus, according to a frequency-based approach, animacy mismatch should have a facilitation effect, while according to an intervention-based approach, number mismatch should lead to better performance. In their experimental data on ORC comprehension, Adani et al. found an animacy facilitation effect that was stable

¹ Friedmann and Novogrodsky used the term *SySLI* to describe individuals with a selective syntactic impairment.

² Adani et al. (2010) used the term *G(rammatical)-SLI* to describe a subgroup of individuals with specific language impairment who have deficits in syntax and morphology.

across all three age groups, while the number mismatch effect was not found in the 3-year-olds, but was observed in the 4 and 5-year-olds. Their results suggest that while both frequency and intervention effects played a role in relative clause performance, there was a clearer effect of age involving intervention.

Thus far, research on intervention and frequency effects in the subject-object symmetry question has largely focused on monolingual children. However, examining bilingual development can lead to further insight into the relative impact of age and frequency of exposure. In the next section, we turn to what is known about relative clauses in bilingual children.

2.3. Previous work on bilingual acquisition

Prior work on the bilingual development of relative clauses has largely focused on the role of crosslinguistic influence in children acquiring typologically different languages. In a longitudinal case study based primarily on diary data, relative clause production was analyzed in the naturalistic language data of three simultaneous Cantonese-English bilinguals, aged 1;0-6;0 (Yip & Matthews, 2007). These children, who were dominant in Cantonese, used Cantonese-like word order (i.e., prenominal relative clause, as in (4)) when producing English relative clauses. In a study on the comprehension of relative clauses in Cantonese, results from 20 simultaneous Cantonese-English bilingual children (aged 4;10-11;11 and dominant in English) suggested that the canonical SVO word order in both languages led to particular difficulty in comprehending Cantonese prenominal object relative clauses (Kidd, Chan, & Chiu, 2015). Thus, in a sentence like (5), the bilingual children tended to interpret the mouse as the agent and the chicken as the theme. Taken together, these results suggest that language dominance and crosslinguistic differences influence relative clause comprehension and production.

- (4) Where's [NP the Santa Claus give me the gun]?
Target: "Where's the gun Santa Claus gave me?"
(Yip & Matthews, 2007)

- (5) Lou5syu2 sek3 go2 zek3 gung1gai1.
[mouse kiss ___] that CLASSIFIER chicken
'The chicken that the mouse kisses'
(Kidd et al., 2015)

Two studies have examined RC comprehension in heritage language children. Heritage language learners are described in the literature as having less exposure to their L1 heritage language than their L2, which is linked to patterns of incomplete acquisition or incomplete or protracted development. Jia and Paradis (2018) found that heritage language children with L1 Mandarin acquiring English as an L2 in Canada performed like monolingual Mandarin-speaking age peers in ORC comprehension, but had significantly weaker scores in production.

Like Cantonese, Mandarin differs from English in having prenominal relative clauses, which could explain the protracted development observed in production. However, Jia and Paradis highlight that English influence on Mandarin relative clauses was not pervasive: While some children produced post-nominal relative clauses in Mandarin, they did not produce more post-nominal than prenominal relative clauses, which one might expect if English word order were being widely applied. Moreover, Polinsky (Polinsky, 2011) showed that heritage language children with L1 Russian acquiring English as an L2 in the United States performed as well as their monolingual Russian-speaking age peers on subject and object relative clauses. Unlike English, word order in Russian is subject to scrambling, which means that object relative clauses in Russian could have either SV or VS orders in the embedded clause, while the SV order is the only possibility in English.

In sum, the overlap between heritage language children and monolingual speakers with the same L1 (Jia & Paradis, 2018; Polinsky, 2011) suggests that limited quantity of exposure did not lead to weaker performance in RC comprehension. However, to our knowledge, no published work has yet focused specifically on the role of L2 exposure in ORC development in sequential bilingual children. We now turn specifically to this question.

3. Research questions and predictions

Current research suggests that both input frequency and intervention effects impact ORC development in monolingual children. In the current paper, we examine the relative influence of each of these factors in ORC comprehension in sequential bilingual children. Our research question concerns whether L2 children with little exposure to the L2 would be equally sensitive to intervention effects in both languages or only in the one with less exposure.

In order to address this question, we collected data from a group of L2 children who are acquiring French in an immersion program in English-speaking Canada. While these learners are exposed to naturalistic French input via instruction delivery, they have limited cumulative exposure to French compared to English, as French is not spoken outside of school in their community.

As shown in (6) and (7) English and French have the same surface word orders for the relative clauses that are the focus of the current study. This allows us to put aside the negative L1 transfer question in order to focus on the role of age versus relative exposure in the comprehension of object relative clauses.

- (6) Montre-moi le garçon que la fille pousse ____
 Show me the boy that the girl is pushing ____
- (7) Montre-moi la fille qui ____ pousse le garçon.
 Show me the girl that _____ is pushing the boy

A frequency-based approach leads to the prediction that the comprehension of object relative clauses should be particularly sensitive to the quantity of language exposure (Prediction 1). However, according to Friedmann et al. (2009)'s approach to intervention effects, sequential bilingual children's performance on object relative clauses should be particularly sensitive to age (Prediction 2). These predictions are laid out in (8) and (9) respectively.

- (8) Prediction 1: If relative exposure (and frequency of input) is crucial in ORC development, then we predict that the French immersion children in our study will perform better in ORC comprehension in English compared to French.
- (9) Prediction 2: If age is the crucial factor in weakening intervention effects, then ORC comprehension in one language should predict performance in the other language.

4. Method

4.1. Participants

Fifteen first grade French immersion students in a predominantly Anglophone area of Canada participated in the study (mean age=6;9, range= 6;1-7;3). These learners are thought to be quite different from sequential bilinguals in majority L2 settings since they elect to have instruction in French and the vast majority of their classmates are also English speakers (e.g. Paradis et al., 2011). Furthermore, the only model French speaker is the classroom teacher and they have little to no exposure to French outside of school. Responses to a parent questionnaire about language exposure confirmed that all 15 participants did indeed have much greater cumulative exposure to English compared to French. At time of testing, participants had the equivalent of 2.83 months cumulative exposure to French (Unsworth, 2013). Participants' language proficiency was evaluated in English using the *CELF-5* (Clinical Evaluation of Language Fundamentals) screening tool (Semel, Wiig, & Secord, 2013) and in French using the *N-EEL* (*Nouvelles épreuves pour l'examen du langage*) (Chevrie-Muller & Plaza, 2001). These scores were used as variables in the statistical analysis.

4.2. Materials and procedures

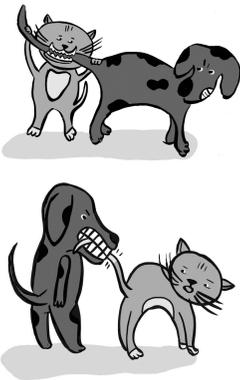
A binary picture-matching task was used in order to assess relative clause comprehension in English and in French (Friedmann & Novogrodsky, 2002). This task was adapted into English and French from the BAMBİ: Battery for Assessment of Syntactic Abilities in Children (Friedmann & Novogrodsky, 2002). This type of task measures the comprehension of targeted syntactic structures. The task was comprised of 36 items belonging to three conditions: subject relative clause, object relative clause and filler. In the targeted conditions

(SRC and ORC), each picture dyad contained two animate characters which could plausibly be either the agent or the theme for each of the sentences. Table 1 contains sample sentences from this task.

Table 1: Sample items from picture-matching task.

| Condition | Example | Number of items |
|---------------------------|---|-----------------|
| Subject relative clause | Show me the dog that is biting the cat. <i>Montre-moi le chien qui mord le chat.</i> | 12 |
| Objective relative clause | Show me the cat that the dog is biting. <i>Montre-moi le chat que le chien mord.</i> | 12 |
| Filler | Show me the bananas that the monkey is pulling. <i>Montre-moi les bananes que le singe tire.</i> | 12 |

Figure 1 illustrates the picture that would accompany the sample SRC and ORC items in Table 1.



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Figure 1: Sample item from picture-matching task

Participants were tested at two-week intervals in order to minimize the effects of seeing the experimental task twice. Parents of participating children filled out a language background and sociodemographic questionnaire prior to the testing sessions. Half of the participants completed the English session first. Each session lasted approximately 30 minutes and was conducted by a member of the research team with the appropriate language background. Sessions took place in a quiet room at the child's school. First, participants completed a verb pre-test in order to ensure that a lack of lexical knowledge would not influence their comprehension of the targeted verbs in the relative clauses. Next, they completed the picture-

matching task. We began each trial by ensuring that participants knew the different characters. For the image in Figure 1, for example, the experimenter would ask each participant to point to the cat and the dog. Then, we moved on to the target sentence designed to elicit relative clause comprehension. Finally, the language proficiency measure in the language of the session was administered.

5. Results

In order to answer our research question, we first ran a mixed-effects logistic regression with random effects for the participants. The outcome variable is success or failure on each item of the picture-matching task. The predictor variables related to the task are language of the task and condition (ORC and SRC). Individual continuous predictors were raw scores on the CELF-5 and the N-EEL as well as age in months. Regression coefficients are presented as odds ratios. The descriptive statistics for the language proficiency variables are presented in Table 2. It is important to note that participants' scores on the two components of the N-EEL are well below those of age-matched monolingual Francophones.

Table 2: Mean proficiency scores

| | Mean raw score (range) | Mean z-score (range) |
|--------------------------------|------------------------|-----------------------|
| N-EEL (French) Morphosyntax | 3.64/8 (2-6) | -2.01 (-3.61 – -0.78) |
| N-EEL (French) Vocabulary | 20.7/32 (16-27) | -9.92 (-16.27– -6.82) |
| CELF (English) | 14.85/26 (11-19) | - |

The descriptive statistics for the picture-matching task are presented in Table 3.

Table 3: Descriptive statistics for picture-matching task

| | ORC % (SE) | SRC % (SE) |
|---------|---------------|---------------|
| English | 82.1 (0.38) | 100 |
| French | 74.6 (0.44) | 97.0 (0.17) |

Table 4 presents the results of a mixed-effects logistic regression. The null model (Model 0) is fitted with random effects for participants. In Model 1, all predictors were entered.

Table 4: Mixed-effects logistic regression

| Variable | Category | Model 0 | | Model 1 | |
|--------------------------|------------------|--------------------|-------|--------------------|-------|
| | | Odds ratio (SE) | Sig. | Odds ratio (SE) | Sig. |
| <i>Fixed effects</i> | | | | | |
| Constant | | 2.78 (0.51) | 0.001 | 0.001 (0.01) | 0.001 |
| Language | French (base) | | | | |
| | English | | | 0.61 (0.21) | 0.150 |
| Type of RC | ORC (base) | | | | |
| | SRC | | | 33.91 (21.04) | 0.001 |
| Age in months | | | | 0.90 (0.11) | 0.413 |
| CELF-5 score | | | | 2.52 (0.68) | 0.001 |
| N-EEL Vocabulary | | | | 1.14 (0.12) | 0.238 |
| N-EEL Morphosyntax | | | | 3.48 (1.92) | 0.03 |
| <i>Random effects</i> | | | | | |
| Level 2 (participant) | | 2.78 (1.69) | | 0.95 (0.79) | |
| <i>Model fit</i> | | | | | |
| -2 LL | | 430.73 | | 244.81 | |
| AIC | | 434.76 | | 257.72 | |
| BIC | | 443.75 | | 292.57 | |

Notes: $n=576$; SE=standard error; AIC= Akaike's information criterion; BIC=Bayesian information criterion

Model 1 is a significantly better fit for the data than the null model ($\chi^2 = 185.92$ (6), $p < 0.001$). Participants were 33.91 ($p < 0.001$) times more likely to correctly identify a picture corresponding to a SRC than an ORC when all other variables are controlled for. Scores on both the CELF-5 ($OR = 2.52$, $p < 0,001$) and the morphosyntactic portion of the N-EEL ($OR = 3.48$, $p < 0,02$) were also significantly associated with performance on the picture-matching task. Age and French vocabulary scores on the N-EEL were not significantly associated with performance on the picture-matching task. Crucially, the language of the task did not predict performance. When all other factors were controlled for, language is not a significant predictor of performance.

Turning now to the individual results. There are two participants for whom we do not have data in both languages; therefore this discussion will focus on the remaining 13 participants.

Table 5: Individual results for chance performance on the picture-matching task

| | EN = FR (above chance in EN and FR)* | EN = FR (not significantly different from chance in either) | EN > FR | FR > EN |
|----------|---|--|---------|---------|
| <i>n</i> | 8 | 3 | 1 | 1 |

**Cut off for chance performance is 8/12, ($z = 1.15$)*

Of the five children who scored below chance in either language, all had weak English scores as measured by the CELF-5 screener and two of these individuals scored below the cut off for typical language development on the CELF-5 screener. These results, while preliminary, suggest that ORC scores in one language predict scores in the other. Therefore, structure, not language best predicts relative clause comprehension in our sample and our results replicate classic subject/object asymmetry found in previous studies.

6. Discussion and Conclusion

The objective of this study was to examine object relative clause (ORC) comprehension in L2 children with limited exposure to the L2. More specifically, we wanted to know if L2 children should be expected to perform poorly on ORCs in the L2 compared to their L1 when exposure to the L2 is limited. In Prediction 1, we stated that if frequency of ORCs in the input plays an important role, then L2 children's performance on ORCs should be closely linked to quantity of L2 exposure. In this case, we would expect these L2 children to take a long time to achieve similar ORC performance in the L2 compared to the L1. However, if age plays a major role in ORC comprehension, as has been argued in previous work

on intervention effects (e.g., Friedmann et al., 2009), then quantity of L2 exposure should not play an important role in the development of such structures (Prediction 2). Instead, performance expectations should be based on age at time of testing.

The overall group results of the picture-matching task revealed a classic subject-object asymmetry in both languages. While overall scores in French were numerically lower than those in English, there was no significant effect of language on ORC scores, when all other variables were controlled for. In other words, the subject-object asymmetry in French was quantitatively similar to the one in English. These results, while preliminary in the sense that they are from only a small group of children, suggest that limited exposure to the L2 (French) did not lead to lower ORC performance compared to the L1 (English). The individual results confirmed the group analyses in that most children fell into one of two groups: (1) those who performed above chance in both languages and (2) those who performed below chance in both languages. This pattern suggests that once L2 children are able to process structures involving an intervener in their language of greater exposure, they are able to do it in the language of less exposure. This appears to be the case even when cumulative L2 exposure is very limited relative to the L1.

Therefore, the group and individual results better support Prediction 2, according to which age plays a larger role in ORC comprehension in L2 children. Once the child reaches the developmental stage that allows for more adult-like processing of intervention effects, ORC comprehension in both the L1 and L2 are impacted.

In this study, we looked at languages that were typologically similar in terms of the surface word order of relative clauses. As with the previous studies on typologically distant languages (e.g., Cantonese and English), it can be difficult to tease apart the effects of typological distance and syntactic complexity in young bilingual children. Indeed, difficulty with ORCs in L2 children could be due to syntactic complexity, ongoing L2 development, L1 influence, or a combination of these factors. Our goal in comparing languages with similar ORC types was to rule out any negative influence from the L1, thus targeting the complexity factor (i.e., intervention effects). Our preliminary conclusion is that, with respect to intervention effects, TD L2 children acquiring English and French should perform similarly in comprehension in both languages, regardless of exposure patterns. Going forward, it would be interesting to see how age and exposure quantity impact sequential bilinguals who are learning typologically distant languages. If the work on heritage children discussed in the Section 2.3 is any indication, it is likely that quantity of exposure will not play an important role in ORC comprehension in children with those language combinations either; however, different patterns could be expected in production. Additional research on other language combinations is needed.

In terms of theoretical approaches to second language acquisition, these results support *syntax-before-morphology* type accounts (see reviews in Slabakova, 2013; White, 2003). While these immersion children have overall

weak vocabulary and morphosyntactic French scores, as evidenced by their very low standardized test scores, a number of them were able to correctly comprehend ORCs in the L2, a structure that has been described as syntactically complex and has been shown to be acquired late in TD monolinguals. The similar results in the L1 and the L2 suggest that L2 children have access to the same syntactic computations in both languages (see also Macswan, 2000) and that the operations involved in processing ORCs come at little cost in TD child L2 acquisition.

Lastly, the fact that relative clause comprehension appears to be acquired early in TD L2 children, while creating difficulty for children with DLD, means that such comprehension tasks have the potential to disentangle the effects of bilingualism from those of language impairment. Additional research examining the utility of an ORC comprehension tool for identifying DLD in multilingual populations is thus warranted.

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