Presotto, Giacomo & Torregrossa, Jacopo. 2024. Intervention and amelioration effects in the acquisition of Spanish object relative clauses: the role of word order and DOM. *Glossa: a journal of general linguistics* 9(1). pp. 1–43. DOI: https://doi.org/10.16995/glossa.11254

Open Library of Humanities

Intervention and amelioration effects in the acquisition of Spanish object relative clauses: the role of word order and DOM

Giacomo Presotto, Goethe University Frankfurt, DE, presotto@em.uni-frankfurt.de

Jacopo Torregrossa, Goethe University Frankfurt, DE, torregrossa@lingua.uni-frankfurt.de

In this study we tested the comprehension of Subject Relative Clauses (SRCs) and Object Relative Clauses (ORCs) by Spanish monolingual children aged 4–6. Our results provide novel evidence that a subject-object asymmetry holds true also for Spanish: SRCs are easier than ORCs. Moreover, the test of different types of ORCs revealed that both overt Differential Object Marking (DOM) and word order properties (i.e. the subject position within the relative clause) constitute ameliorating factors in the comprehension of ORCs. Children proved to benefit more from word order than DOM-marking, with pre-verbal subjects bringing about higher accuracy rates than overt DOM. Moreover, these cues interact when occurring together: children's comprehension decreases when ORCs with a pre-verbal subject also feature overt DOM. We additionally measured children's knowledge of the grammar underlying DOM through an ad-hoc Sentence Repetition Task and found that DOM constitutes an ameliorating cue only with children who have acquired it. At the empirical level, we integrate these findings with the vast literature on children's comprehension of relative clauses and advance a new descriptive generalisation of which grammatical properties characterise as ameliorating cues across languages. At the conceptual level, we interpret our results as evidence for both processing-oriented theories and grammar-based accounts to intervention locality. Whereas the interaction between DOM and word order suggests an effect of processing cost, the fact that cues need to be associated with an acquired grammatical representation inevitably tie amelioration effects to language-specific factors. We show that this apparent contrast is predicted if amelioration effects are regulated at the interface between the grammar and the performance system, and argue in favour of an interface interpretation in line with *tout court* minimalist criteria.

1 Introduction

It is a well-established observation that there exists a substantial asymmetry between subject relative clauses (SRCs) and object relative clauses (ORCs). Indeed, SRCs are typically easier for children to comprehend (de Villiers et al. 1979; Tavakolian 1981; Goodluck & Tavakolian 1982; Corrêa 1995; Friedmann et al. 2009; Lau & Tanaka 2021) and similarly, they pose fewer challenges for adults during processing (Frauenfelder et al. 1980; Ford 1983; Clifton & Frazier 1989; Schriefers et al. 1995; Mak et al. 2002). With regard to child populations in particular, a greater difficulty in the comprehension of ORCs as compared to SRCs has been consistently observed in several languages over the last two decades (Adani et al. 2010 for Italian; Bentea et al. 2016 for French; Morrill and Gavarró 2010 for Catalan; Sevcenco and Avram 2012 for Romanian a.o.). The first aim of this study is to investigate whether this asymmetry holds true for Spanish, a language which, to the best of our knowledge, has hardly been investigated in this particular respect before.[1] To this end, we tested Spanish monolingual children's comprehension of both SRCs and ORCs. The results show that, as expected, the former are overwhelmingly better comprehended.

Another point that has been frequently addressed in the literature concerns the role of language-specific factors in the comprehension of ORCs in particular. Interestingly, languages have been shown to differ with respect to how idiosyncratic properties of their grammar impact on children's comprehension of these structures (Belletti et al. 2012; Guasti et al. 2012; Bentea 2016). For this reason, in a second comprehension task, we take into account two particular properties of Spanish ORCs, namely the position of the subject within the relative clause and the prepositional marking of (animate) direct objects, widely known as Differential Object Marking (DOM). The manipulation of these two variables produces four types of ORCs, whose variation depends on whether the subject is pre- or post-verbal and whether DOM is overtly realised or not (cf. Section 2.1 for details). We found that these differences are non-trivial as the statistical analysis reveals an effect of both word order and DOM. Specifically, pre-verbal subjects and overt DOM bring about higher comprehension rates. These facts strike us as particularly revealing, for both factors can be used to pin down the thematic relations that inform the sentences at issue, as will be extensively discussed in Section 2. We integrate these original data with available cross-linguistic evidence and advance a first empirical generalisation of which properties can ameliorate children's comprehension of ORCs in which languages. In a nutshell, we characterise so-called ameliorating cues as grammatical properties that allow the parser to distinguish the subject from the object. Another crucial aspect of our findings is that (overt) DOM does ameliorate children's comprehension of ORCs, but only

[1] See, however, unpublished results by Torrens (2017). As far as production is concerned, moreover, a higher difficulty with ORCs was already observed by Ferreiro et al. (1976) and, more recently, Ezeizabarrena (2012).

when it is not concurrent with a cue that is based on word order (in our case pre-verbal subjects). Moreover, we show that the impact of DOM strictly depends on its acquisition. Based on DOM-mastery scores assessed through a sentence-repetition-task, we found that DOM has an impact on ORCs' comprehension only with those children who have associated DOM with its grammatical function, whereas no DOM effect emerges with children who have not acquired it yet.

We interpret these results in the broader debate on the source of locality effects, taking into account the well-known divide that holds between "grammar-based approaches" and "processing-based approaches" (for a discussion, see Boeckx 2008b; 2012; Hofmeister & Sag 2010; Belletti & Rizzi 2013; Phillips 2013; Sprouse et al. 2013 a.o.). Whereas the former construe locality effects as the outcome of deep grammatical principles, the latter try to derive the same set of phenomena calling upon independent principles of cognition. Using Sprouse et al.'s (2013) wording, the central difference between the two is that processing accounts "*seek to reduce [locality] effects to one or more components of the sentence-processing system that are motivated by language-independent perceptual or cognitive properties.*" (Sprouse et al. 2013: 23). With regard to this, Phillips (2013) and Sprouse et al. (2012) suggested that processing-based approaches be rather called "reductionist approaches", exactly because they aim at *reducing* locality to factors that are outside the grammar and fully independent from it. Note that the cited literature has typically addressed the problem from the perspective of (extraction from) syntactic islands. In this study, we broaden the scope of this debate to include another instance of locality constraints, namely intervention locality.[2] Many scholars have defended accounts to intervention effects and their alleviations that rely on extra-grammatical factors. A paradigmatic example of these is represented by so-called "experience-based" theories (a.o. Bever 1970; MacDonald & Christiansen 2002; Wu et al. 2018), in which the general prediction is that "[…] *comprehenders are sensitive to the statistical regularities in lexical and structural input, and can use their prior experience with linguistic signals to predict the upcoming structure*" (Wu et al. 2018: 24).[3] In a broader sense, however, all approaches that resort to domain-general constraints on language processing to explain the relative cost of ORCs (see e.g. Gordon et al. 2001; 2004; Warren & Gibson 2002; 2005) can be legitimately categorised as "reductionist". On the other hand, a theory like Relativised Minimality (Rizzi 1990; 2004; 2018; Starke 2001; Friedmann

[2] For a discussion of the distinction between "impenetrability locality" and "intervention locality" see Rizzi (2013). Object A-bar dependencies like the ORCs tested in our study are typical examples of structures involving an intervention configuration, as the subject *intervenes* between the object's surface position and its interpretative site. We will return to these aspects in Section 5.

[3] Under the label of "experience-based theories" there are in fact several different accounts, the discussion of which is beyond the scope of the current study. What we want to highlight is that regardless of their specifics, all these theories construe processing strategies of relative clauses as driven by domain-general principles based on statistical computation, thus outside the realm of factors specific to the language faculty.

et al. 2009), which defines intervention effects as solely affected by syntactic rules, is a natural representative of aforementioned grammar-based approaches.[4] Considering the results of our experiments, a processing-based approach is seemingly better equipped to interpret at least some aspects of the emergent pattern. For instance, the negative impact of simultaneous cues on ORCs' comprehension can be construed as a direct consequence of the child parser being overloaded. At the same time, though, a grammar-based approach to (intervention) locality proves superior in accounting for the fact that DOM's effectiveness additionally depends on its acquisition. Evidently, such an outcome is only predicted if the strategies at the base of amelioration effects hinge on grammatical representations and presuppose grammatical competence. Nonetheless, we will illustrate that even a tout-court grammatical approach like Relativised Minimality is challenged by our data, especially (but not only) because the latter cannot predict a negative interaction between two otherwise effective ameliorating cues (i.e. word order cues and DOM cues). For these and other reasons that will be elaborated on in the next sections we advance the hypothesis that, at least as far as intervention locality is concerned, neither approach is entirely flawless, and that a more suitable option lies in a third, intermediate perspective. Specifically, we argue that intervention effects in Spanish ORCs and ameliorations thereof are naturally predicted if their source resides at the interface between the grammar and performance systems. In such a scenario, both language-specific factors and more general constraints on sentence processing are expected to contribute to surfacing locality effects, and this is exactly what our findings suggest. Indeed, we illustrate that whereas the integration of ameliorating cues is subject to the cognitive limitations of the child parser (two cues are overly taxing), amelioration strategies must be necessarily anchored to deep grammatical representations (DOM is only effective if acquired). In essence, our proposal conforms to the minimalist effort to pursue interface-based accounts and look at domain-general properties to free the grammar from dispensable stipulative mechanisms (Chomsky 2005; 2017; Berwick & Chomsky 2016; Hornstein 2018; Chomsky et al. 2019).[5] An endeavour, this, that has been regarded as particularly desirable for locality-related phenomena (Boeckx 2012; Dillon & Hornstein 2013, and Presotto 2024a for a discussion).

The paper is organised as follows. Section 2 provides the theoretical background. First, we take into account cross-linguistic data on children's comprehension of ORCs and put forth an empirical generalisation of what qualifies as an ameliorating cue. Then, we illustrate the main properties of Differential Object Marking and relative clauses in Spanish (Section 2.1). Section 3 presents our study and deploys our research questions. Section 4 details our methods and the results of the experiments. In section 5 we discuss our findings. Section 6 concludes.

[4] We will extensively discuss Relativised Minimility's characteristics and predictions throughout the paper.

[5] In our case, we will argue that there is no obvious need to posit a host of syntactically encoded rules to interpret and regulate ameliorating effects, as Relativised Minimality has purported thus far (see Section 5).

2 Background – Amelioration effects in the comprehension of object relative clauses

Robust evidence has been provided that, albeit overall taxing, ORCs can be made easier under certain conditions. For instance, the seminal work by Friedmann et al. (2009) showed that Hebrew-speaking children find it easier to comprehend ORCs in which the object, but not the subject, is lexically restricted. A comparable result has been found for Italian, where a mismatch in number between the subject and the relative head facilitates children's comprehension of ORCs (Adani et al. 2010). Similarly, German children get more accurate when ORCs are disambiguated by morphological case (Arosio et al. 2012). These types of alleviations to the typical penalty associated with ORCs are generally referred to as "amelioration effects". And the particular property that triggers the amelioration is defined as an "ameliorating cue".

What is especially interesting about these facts is that ameliorating cues are not universally valid. Rather, speakers of different languages seem to benefit from different properties of their grammar when it comes to comprehending arduous structures like ORCs.[6] In a most influential paper, Belletti et al. (2012) tested Hebrew- and Italian-speaking children with gender-matched and gender-mismatched ORCs. They found that gender mismatches ease ORCs' comprehension in Hebrew, but crucially not in Italian. Hebrew stimuli were like (1a) in the gender-match condition and (1b) in the gender-mismatch condition.

(1) Adapted from Belletti et al. (2012)

a. Tare li et ha-yalda she-ha-isha mecayeret
show to-me ACC the-girl.F that-the-woman.F draw.3SG.F
'Show me the girl that the woman draws.'

b. Tare li et ha-yalda she-ha-rofe mecayer
show to-me ACC the-girl.F that-the-doctor.M draw.3SG.M
'Show me the girl that the (male) doctor draws.'

Likewise, the subject and the object in the tested Italian ORCs were specified for either the same (2a), or different (2b) gender features.

(2) Adapted from Belletti et al. (2012)

a. Mostrami la bambina che la nonna bacia
show-to-me the.SG.F girl.SG.F that the.SG.F grandma.SG.F kiss.3SG
'Show me the girl that the grandma kisses.'

[6] As a matter of fact, it is conceivable that more general aspects like, for instance, semantic plausibility can indeed ameliorate ORCs across languages. Concretely, a sentence like *The mouse that the cat chases* is likely to be more readily accessible than *The cat that the mouse chases*. The effect of plausibility, however, is typical of filler-gap dependencies in general, and has to do with more surface aspects of sentence processing (Traxler & Pickering 1996). In the literature on amelioration effects to ORCs these factors are typically controlled for in order to restrict the focus to morphosyntactic properties. We conform to this approach in the present study.

b. Mostrami il dottore che la bambina disegna
show-to-me the.SG.M doctor.SG.M that the.SG.F girl.SG.F draw.3SG
'Show me the (male) doctor that the girl draws.'

A central difference between the two languages is that, differently from Italian, Hebrew's main verb inflects for gender in undergoing agreement with the subject (Shlonsky 1997). The authors interpreted the results as a corroboration of the featural Relativised Minimality approach (Starke 2001; Rizzi 2004), whereby the degree of disruption in the integration of ORCs and, more generally, Object A-bar dependencies, is modulated by the featural specification of the subject and the object. In particular, the fact that gender is only relevant in Hebrew would support the claim that only features that are "syntactically active" are taken into account in the computation of intervention effects. Somewhat simplifying, active features are features that are capable of triggering movement operations (cf. Rizzi 2013; 2018 for a discussion). Since gender qualifies as a movement-triggering feature in Hebrew, but not in Italian, the intervention configurations of Hebrew and Italian ORCs will differ with respect to the presence of this very feature. That is, gender is involved in the computation of locality effects in Hebrew, but not in Italian, as exemplified below:[7]

(3) Hebrew

a. Tare li et ha-yalda she-ha-isha mecayeret
show to-me ACC the-girl.F that-the-woman.F draw.3SG.F
[+R, +NP, +fem] **[+NP, +fem]**

b. Tare li et ha-yalda she-ha-rofe mecayer
show to-me ACC the-girl.F that-the-doctor.M draw.3SG.M
[+R, +NP, +fem] **[+NP, +masc]**

(4) Italian

a. Mostrami la bambina che la nonna bacia
show-to-me the.SG.F girl.SG.F that the.SG.F grandma.SG.F kiss.3SG
[+R, +NP] **[+NP]**

b. Mostrami il dottore che la bambina disegna
show-to-me the.SG.M doctor.SG.M that the.SG.F girl.SG.F draw.3SG
[+R, +NP] **[+NP]**

The fact that gender is represented in (3) defines two distinct set-theoretic relations between the relative head and the intervening subject. In (3a), the featural bundle of the object includes that

[7] We report the relevant featural bundles as they were originally illustrated by the authors, where [+R] stands for relative feature and [+NP] represents the lexical restriction. Both, according to this approach, qualify as *bona fide* triggers for movement.

of the subject, whereas in (3b) the two bundles intersect. In the case of Italian instead, gender is never involved in such a calculation, hence the unchanged inclusion relation in (4a) and (4b). This is crucial, for it is exactly this type of set-relation that determines the degree of disruption of ORCs, with inclusion being significantly harder than intersection.[8] Again, this would explain why only Hebrew-speaking children can benefit from gender-mismatched ORCs.

This type of analysis has been further maintained (among others) for French, where number-mismatched ORCs seem to be better comprehended by children than their number-matched counterparts (Bentea & Durrleman 2017; Durrleman & Bentea 2021). Such a result straightforwardly follows from Relativised Minimality since number features in French are attractors for movement and, thus, visible to the syntactic computation of intervention effects.

The Relativised Minimality approach has undoubtedly unveiled relevant aspects of children's comprehension of ORCs and their ameliorations, as well as provided meticulous tools for the investigation of the phenomenon in a cross-linguistic perspective. In spite of its thorough theoretical basis, however, Relativised Minimality is not always unquestionably supported by empirical data. For instance, Guasti et al. (2012) tested the comprehension of ORCs by Greek and Italian children and found that the former perform better when overt case marking disambiguates argumental DPs (much as what Arosio et al. 2012 found for German). Even though the authors do call upon Relativised Minimality to construe their findings, it is not obvious why case should bring about amelioration effects, for it is unclear whether it can be analysed as a "syntactically active" feature. As a matter of fact, case is explicitly predicted to not count as an ameliorating feature in this framework because it is not a trigger for movement (Friedmann et al. 2017).

Another crucial assumption in this approach is that the lexical restriction on a DP, characterised as a [+NP] feature, modulates intervention effects *qua* licensor of syntactic positions (Rizzi 2018: 349–355). The prediction for ORCs is that anytime the object and the (intervening) subject share a [+NP] feature specified with the same phi-features (cf. Belletti et al. 2012 et seq.), intervention effects arise resulting in poorer comprehension of the sentence by children. Conversely, when either the subject or the object is not lexically restricted (as is the case with pronouns), an amelioration effect is predicted. This is borne out in a large number of studies. Still, in a paper on Romanian children's comprehension of relative clauses, Sevcenco & Avram (2012) present results that go in the opposite direction. In one task, the authors tested sentences like those displayed in (5). In (5a) an overt subject DP (*piticul*) occurs in postverbal position, whereas in (5b) and (5c) the subject is expressed by a null pronoun. As pointed out in

[8] As Belletti et al. (2012: 1064) put it, *"any configuration in which the intervener would differ from the target in at least one relevant feature specification would create a structure which could be computed by the child system. Thus, cases of inclusion are problematic, but cases of* […] *intersection (at least one feature in the intervener differs from the target) are fine for children".*

the paper, sentences like (5c) are ambiguous between a SRC and ORC reading.[9] Sentences like (5b) are, instead, never ambiguous, for the authors ensured that the verb was always plural and the relative head singular.

(5) Adapted from Sevcenco & Avram (2012)

a. prințesa care o fotografiază piticul
princess-the.F.SG who her.ACC.3.F.SG photograph.3SG dwarf-the.M.SG
'the princess whom the dwarf is photographing'

b. fata care o stropese
girl-the.F.SG who her.ACC.3SG.F splash.3PL
'the girl whom they are splashing'

c. broaștele care le salută
frog-the.F.PL who them.ACC.3.F.PL greet.3SG/PL
1: 'the frogs whom they/he is/are greeting'
2: 'the frogs that are greeting them'

Participants (monolingual children aged 4;0–7;5) understood sentences like (5a) in 80.29% of cases but were only 67.9% accurate with sentences like (5b). Moreover, they assigned an ORC interpretation to sentences like (5c) only 51.2% of the time. Independently of the results with sentences like (5c), whose interpretation is complicated by their inherent ambiguity, children seem to perform better with sentences like (5a) rather than (5b). That is, the presence of a lexical restriction (i.e. [+NP] feature) on the subject eased children's comprehension despite the relative head being lexically restricted as well.[10] Conversely, the [+NP]-mismatch between the object and the (null) subject produced significantly lower accuracy.

Based on these observations, we look at these phenomena from a fairly different angle. That is, we adopt a broad perspective on the empirical evidence on amelioration effects in ORCs and try to surmise their commonalities across languages.

What we believe can be extrapolated from such data is that children tend to perform better when ORCs can be somehow disambiguated from SRCs. More in detail, we contend that children's comprehension likely improves when morphosyntactic cues are available that allow the parser

[9] Indeed, for these stimuli the authors selected verbs from a class where the third person form in the present tense of the indicative is syncretic for number.

[10] In the above example, the relative head bears masculine gender and the subject bears feminine gender. One could argue that this mismatch alone is sufficient to weaken/nullify intervention effects, as is the case in Hebrew (Belletti et al. 2012). If so, two issues would arise. First, it is not clear why gender should qualify as a syntactically active feature in Romanian but not in Italian, given that neither show gender agreement on the main verb. Second, if phi-features in Romanian are capable of weakening intervention effects regardless of their realisation on the verbal morphology, then number mismatches like that in (5c) should trigger similar (if not better, given the non-lexically-restricted intervener) accuracy rates. Yet a big difference occurs between the two conditions.

to tease apart the object from the subject and, hence, construe the relations between the verb and its arguments.[11] We will also clarify in the discussion that such morphosyntactic cues need to be acquired in order to trigger ameliorations, which crucially ties their effectiveness to their grammatical function. For now, however, we limit ourselves to build upon these considerations to put forth a first descriptive generalisation that demarcates the properties of a (potentially ameliorating) morphosyntactic cue:

(6) *Descriptive generalisation of 'morphosyntactic cue'*
A morphosyntactic cue is a grammatical property whose presence or absence implies that a given constituent is either the subject or the object of a given clause.

Based on this, not only can we infer what can constitute an ameliorating cue in which language, but also make sense of amelioration effects that seemingly fall outside the reach of Relativised Minimality's predictions. Before we do that, let us clarify some aspects of (6).

First, by no means does our generalisation imply that anytime a morphosyntactic cue is available amelioration effects arise. It simply states that when these emerge, there is at least one morphosyntactic cue that can disambiguate the structure. Second, the distinction between presence and absence of a given grammatical property is grounded on the observation that sometimes even just the lack of, for instance, some relevant morphological exponent can rule out certain interpretations and disambiguate the sentence, as is the case in the Spanish ORCs discussed in Section 2.1. Third, and perhaps most importantly, we need to elucidate the ontological status of our generalisation. Taken alone, it is not much more than an empirical observation of the facts. It surely provides accurate predictions on amelioration effects, but it is not a theory of amelioration effects in its own right. For this reason, we pair the descriptive power of (6) with a broader speculation on the system underlying ameliorations to intervention locality. This is pursued in the discussion. We first try to corroborate our claim by taking into account the literature discussed above.

All the amelioration effects we reviewed conform to (6). For instance, the fact that a gender-mismatch between the subject and the object increases children's comprehension of Hebrew ORCs straightforwardly follows from it, as in such a case the gender morphology on the verb unambiguously points to the subject DP. Of course, though, verbal inflection is not the only expected ameliorating cue. We deliberately adopt a general term though "grammatical property" to make sure we embrace other relevant factors. Among these are case marking, word order, and, in fact, anything that reveals the subject/object status of a nominal. This way, ameliorations triggered by (unambiguous) case morphology in e.g. German (Arosio et al. 2012) or Greek (Guasti

[11] A similar idea is pursued by Polinsky et al. (2012) in a study on Avar, an ergative-absolutive language. There, the authors maintain that ergative case-marking eases the processing of RCs featuring an absolute object gap as the former allows the parser to infer the presence of the gap well in advance (see also Bornkessel & Schlesewsky 2006).

et al. 2012) naturally ensue. Word order is also expected to play a role insofar as it allows to discern the subject or the object. We will show that the results of our study go in this exact direction (cf. sections 4.3 and 5).

Another welcome outcome of our generalisation is that it avoids altogether the issues that some ameliorating cues pose to Relativised Minimality. In this regard, we have already mentioned how case is inherently predicted to contribute to amelioration effects. Moreover, the data from Romanian ORCs like (5) are also fully in accord with (6). As discussed by Sevcenco & Avram (2012), indeed, the presence of an NP subject alone guarantees the disambiguation between ORC- and SRC-readings. So whereas (7a) is only unambiguous if the direct object clitic (in this case *îl*) and the relative head have distinct phi-features, (7b) does not need such a proviso since "[a]*n overtly realised pre-verbal or post-verbal subject* […] *in the embedded clause bans the* [SRC-] *reading*" (Sevcenco & Avram 2012: 221).[12]

(7) Adapted from Sevcenco & Avram (2012)

a. fata care îl vede
girl-the.F.SG that him.ACC.3SG.M see.3SG
'the girl who sees him'

b. băiatul care (tata) îl vede (tata)
boy-the.M.SG that (father.SG.M) him.ACC.3SG.M see.3SG (father.SG.M)
'the boy whom the father sees'

To summarise, we suggest that available evidence on children's comprehension of ORCs allows us to draw the following conclusion: it is only when a disambiguation between the subject and the object is possible that ORCs can be made easier. We formalised this observation in (6), which provides a descriptive generalisation of the properties constituting morphosyntactic cues. These, we claim, represent a necessary (but not sufficient) condition for amelioration effects to arise.

Below we introduce some properties of Spanish relative clauses that meet our definition of morphosyntactic cue, namely Differential Object Marking and subject position. The design of our experiment, presented in Section 4, builds upon those very properties in order to test whether they correlate with facilitations in children's comprehension of ORCs.

2.1 Differential Object Marking and word order in Spanish relative clauses

Spanish DOM is a complex phenomenon, whose properties have long eluded a unitary and definitive account. Because of its multi-faceted nature, DOM is taken to be regulated by conditions at the interface of syntax, morphology, lexical semantics, and pragmatics. At the syntactic level, DOM has been described as the raising of (some) direct objects to the specifier of vP (Torrego 1998;

[12] For more detailed information on this contrast we refer directly to the cited source.

Rodríguez-Mondoñedo 2007), resulting in the morphological marking of the moved constituent with an *a* morpheme, homophonous with the Spanish dative preposition:

(8) María saluda a Pedro
María greet.3SG DOM Pedro
'María greets Pedro.'

This *a* morpheme can occur as an amalgam with the definite article when this is masculine (9a), or remain unbound when this is feminine (9b).

(9) a. María Saluda al niño
María greet.3SG DOM.the boy
'María greets the little boy.'

b. María Saluda a la niña
María greet.3SG DOM the girl
'María greets the little girl.'

The class of objects eligible for DOM is determined by semantic properties including (among others) being human or not, specificity, affectedness, definiteness, and topicality (Bossong 1991; Torrego 1998; 2002; Aissen 2003; Leonetti 2004; López 2012). More in detail, Aissen (2003) proposed that these features are arranged hierarchically, and that languages can differ with respect to what level on the hierarchy determines the class of objects that will exhibit DOM. Roughly, objects that rank high on the animacy scale (Human > Animate > Inanimate) tend to be differentially marked as prominent objects. And the exact rank of an object on the hierarchy additionally determines whether DOM is obligatory or optional. That is, high ranks will result in obligatory DOM, medium ranks in optional DOM, and low ranks in lack of DOM.

As far as Spanish is concerned, DOM is obligatory with [human; definite; specific] objects. Determining the exact boundaries of DOM optionality is, however, not as immediate, for a number of further syntactic, pragmatic, and diatopic factors come into play.[13] In this study we restrict our focus to obligatory DOM in standard Peninsular Spanish and, specifically, in relative clauses contexts.[14]

[13] The exact distribution of DOM constitutes a complicated issue and is still not fully determined. Another open question regards the status of the *a* morpheme, which has been alternatively described as a (semi-)lexical preposition or a mere case marker. The discussion of these issues is, however, far beyond the scope of this study. The interested reader can refer to Torrego (1998); Aissen (2003); Leonetti (2004; 2008); Rodríguez-Mondoñedo (2007); López (2012).

[14] For a discussion of the derivation of these structures and the structural representation of DOM in Spanish RCs, we refer to Presotto (to appear). In this work, it is argued that Spanish RCs can be derived in a raising fashion based on a double-headed structure *à la* Cinque (Cinque 2020). The alternation between the surface presence vs. absence of overt DOM is instead addressed using Svenonius' Spanning theory (Svenonius 2016; 2020). In essence, it is contended that even when bare *que* occurs, all the DOM-relevant projections can (but need not) be underlyingly represented at the structural level.

In SRCs, DOM is necessarily realised if the object is [human; definite; specific], as in (10):

(10) el niño que saluda al futbolista
the boy that greet.3SG DOM.the footballer
'the boy that greets the footballer'

Crucially, lack of DOM in (10) results in ungrammaticality under the SRC-reading. The only available interpretation would be, in fact, one where *futbolista* is the subject of the relative clause, turning the structure into an ORC, as in (11).[15]

(11) el niño que saluda el futbolista
the boy that greets the footballer
'the boy that the footballer greets'

Differently from SRCs, however, ORCs show some variation in their surface form. In spite of their uniform meaning, these structures can vary along two dimensions: the position of the subject within the relative clause, and the (non-)realisation of an overt DOM-marker in front of the relativiser *que*.[16] The full paradigm is shown in (12), where the subject occurs after (12a,b) or before (12c,d) the inflected verb, and the DOM-marker *al* between the relative head and the relativiser is realised (12b,d) or not (12a,c):

(12) a. el niño que saluda el futbolista
the boy that greet.3SG the footballer
'the boy that the footballer greets'

b. el niño al que saluda el futbolista
the boy DOM.the that greet.3SG the footballer
'the boy that the footballer greets'

c. el niño que el futbolista saluda
the boy that the footballer greet.3SG
'the boy that the footballer greets'

b. el niño al que el futbolista saluda
the boy DOM.the that the footballer greet.3SG
'the boy that the footballer greets'

[15] We discuss this contrast more in detail below as well as in Section 3. On the disambiguation between SRCs and ORCs based on (absence of) DOM, see also Betancort et al. (2009: 1917–1918), Ezeizabarrena (2012: 165–166), and Perpiñán (2010: fn 37).

[16] There is an ongoing debate concerning the categorial status of *que*. This, depending on the context, has been characterised either as a complementiser/relativiser or as a relative pronoun. For the sake of simplicity, we adopt the former interpretation, which seems the most widely accepted alternative, at least in subject- and object-relativisation (cf. Brucart 1992; Arregi 1998; Perpiñán 2010). Nonetheless, because nothing hinges on this distinction in our study, no crucial issues would arise if Spanish *que* were to prove better fitting the pronominal status. An interesting analysis along these lines has been proposed for Italian in Poletto & Sanfelici (2018; 2019).

Leaving aside possible information-structural discrepancies,[17] the sentences in (12) have the exact same meaning. That is, they are all equally unambiguous ORCs. This is so because each of them features at least one disambiguating morphosyntactic cue meeting the definition in (6). In particular, (12a) is unambiguous due to the fact that the NP within the relative clause is *not* introduced by DOM. This imposes that its only grammatical interpretation is that of subject of the sentence. Had *el futbolista* been the object, indeed, it should have been DOM-marked, as in (10). Because the relevance of such a cue relates to the absence of DOM, we dub this (type of) cue "*in-absentia* cue". Conversely, (12b) displays a case of "*in-praesentia* cue", represented by the overt *al* morpheme that DOM-marks the NP in the relative head position and points to its object status.[18] (12c) is disambiguated by word order properties: the NP within the relative clause occurs in front of the inflected verb, which is a position dedicated to subjects in Spanish relative clauses. Finally, (12d) displays both a preverbal subject and an overt DOM-marker.

Overall, (12) showcases instances of ORCs whose interpretation is made unambiguous by, respectively, one cue in isolation (12a–c) and two simultaneous cues (12d). Additionally, (12a) hinges on what we dubbed *in-absentia* cue, which is descriptively different from the overt *in-praesentia* cues in (12b–d). In the next section we present our study and discuss how these differences are relevant for its purposes.

3 The study

In the previous sections we discussed how ORCs are more difficult than SRCs. We also pointed out that the burden associated with ORCs can be alleviated by morphosyntactic properties that qualify as ameliorating cues. Based on the literature on amelioration effects, we put forth a descriptive generalisation of what constitutes an ameliorating cue, which we repeat here in (13):

(13) A morphosyntactic cue is a grammatical property whose presence or absence implies that a given constituent is either the subject or the object of a given clause.

We can now clarify the reason why we distinguish between the presence and the absence of a specific grammatical property. As illustrated in Section 2.1, in cases like (12a) it is the sheer absence of DOM that manifests the subjecthood of the NP within the relative clauses. Once more, because *futbolista* is [human; definite; specific], it needs to be marked with the DOM particle *a* (in

[17] For instance, it has been proposed that pre-verbal subjects may convey new information and post-verbal subjects old information (Gutiérrez-Bravo 2005). Regardless, both orders are judged equally acceptable in relative clause contexts by native-speakers (cf. also Betancort et al. 2009: 1918, Brown & Rivas 2011: 23, del Río et al. 2012: 2111, Ezeizabarrena 2012: 2–3, and Sagarra et al. 2019: 123–124). As for the DOM-marker, its realisation (in conjunction with the definite article *el/la*) is fully optional (cf. Sagarra et al. 2019: 123).

[18] The distinction between *in-praesentia* and *in-absentia* cues is purely descriptive in nature. It simply refers to the fact that whereas the former are overt and readily available to the parser, the latter are significant due the lack of some morphological element whose absence has some inevitable grammatical entailment. We will further clarify this aspect in Section 3.

fact, the amalgam *al*) any time it occurs in object position. If DOM is not realised, then, it follows that the NP at issue is not the object but, rather, the subject of the clause. We distinguished cues of the latter type from cues that hinge on properties available in the surface structure of a sentence, be these overt morphological exponents, as in (12b), or related to the order of the linearised constituents (12c). We defined the former *in-absentia* cues, and the latter *in-praesentia* cues. Although these labels only rest on a descriptive distinction of what, other things being equal, involves the same implications, we do suspect *in-absentia* and *in-praesentia* cues be potentially distinct in their amelioration capacity. In particular, *in-absentia* cues are conceivably costlier than *in-praesentia* cues as the information they convey, we suggest, is not as easily accessible to the parser (cf. Section 5).

Morphosyntactic cues can be further classified based on the grammatical property that defines them. As shown in (12), Spanish ORCs can be disambiguated via morphological cues (i.e. DOM) and/or purely syntactic cues determined by the linear order of constituents (in our case, the position of the subject). In this study, we aim to find out precisely whether and to what extent different types of disambiguating cues can alleviate the arduousness typically associated with ORCs. More in detail, we test how *in-absentia* DOM, *in-praesentia* DOM, and word order properties (henceforth WO) impact on children's comprehension of Spanish ORCs. Furthermore, we seek to understand whether different effects emerge based on the number of available cues and whether these interact in some way. First, though, we need to establish whether a SRC-ORC asymmetry holds true in Spanish children's comprehension. Albeit expected, this outcome is yet to be validated experimentally, which is why our first research question is the following:

RQ1: Is there a subject-object asymmetry in Spanish children's comprehension of relative clauses?

Once the relative cost of ORCs is determined, we will be able to infer whether they can be ameliorated and under which conditions. Concretely, our first experiment tests children's comprehension of SRCs as opposed to ORCs, using ORCs with post-verbal subjects and *in-absentia* DOM. Our second experiment focuses instead on the comprehension of ORCs disambiguated by, respectively, one *in-absentia* cue (i.e. *in-absentia* DOM), one *in-praesentia* cue (i.e. either DOM or WO), or two simultaneous *in-praesentia* cues (i.e. both DOM and WO). These conditions were represented in the paradigm in (12). Testing children with such structures will allow us to address our second research question:

RQ2: Do DOM and WO cues ameliorate the comprehension of ORCs by Spanish-speaking children? Do these cues interact in any way? Is there a difference between *in-absentia* and *in-praesentia* DOM cues?

In a previous study, we tested the exact same sentences with an adult population and took into account their accuracy in the comprehension of such structures, as well as the reaction times (RTs) associated with their responses (Presotto 2024b). Unsurprisingly, comprehension of SRCs was at ceiling and, consistent with the results in Betancort et al. (2009), the correspondent RTs were overall faster than those of ORCs. Interestingly, however, not all ORCs brought about the same outcome. Participants' accuracy was virtually at ceiling with all ORCs but the ones that were only disambiguated by a single *in-absentia* cue (like (12a)), which produced drastically lower rates (58.85%). As for the respective RTs, we found that these were the highest when only *in-absentia* DOM occurred, and significantly decreased as soon as DOM was overt or there was a pre-verbal subject.[19]

Hindrances in adult on-line processing have been argued to be connected with children's difficulties in comprehension (Belletti & Rizzi 2013; Phillips & Ehrenhofer 2015 and references therein). Thus a natural prediction for our current experiments would be that children, much as adults, exhibit worse performance with ORCs as a whole. Among the latter, then, those featuring a single *in-absentia* cue should result in even poorer accuracy rates.

As mentioned in the introduction, though, we hypothesise that the acquisition of the grammar that underlies a specific cue might play a non-negligible role. In fact, this aspect could conceivably determine some discontinuity between child off-line data and adult on-line data. Whereas the adult parser likely relies upon a number of substantially automatised procedures (Baddeley & Hitch 1974; Ferreira et al. 2002; Givón 2002; Jefferies et al. 2004; Sturt et al. 2004; Ferreira & Patson 2007; Ferreira & Lowder 2016 and references therein), this is not always necessarily true for children, especially when dealing with material that is being acquired. In this regard, it has been maintained that children employ greater resources to analyse aspects of the target grammar that are in the process of being acquired or have been recently acquired. According to Biberauer's *Maximise Minimal Means* model (Biberauer 2019a; b), children are indeed predicted to maximise the resources at their disposal and "*consistently focus on input that is 'just right'*, […] *minimising attention to any* [input] *which has become 'too simple' (as this has already been accounted for and is therefore 'uninteresting' and not worthy of cognitive resources)*" (Biberauer 2019a: 216), eventually suggesting that the parser be particularly committed when attending to new aspects of the target grammar.[20] In a way then, cues that turn on different aspects of the target grammar are likely to be processed differently. Those that characterise as material to acquire (hence "worthy of attention") will draw more resources, whereas those

[19] The results of this study are available in the Supplementary Materials.

[20] Note that these facts quite naturally follow from the well-established observation that *input* (i.e. all the auditory stimuli) and *intake* (i.e. what the acquirer actually focuses on) are two distinct things (Evers & van Kampen 2008; Gagliardi 2012; Lidz & Gagliardi 2015). If children "*filter their input to identify critical information to learn from*" (Lidz & Gagliardi 2015: 349), they will evidently concentrate available resources to such prominent, filtered input.

that build on consolidated grammar will rather be more automatised. We could say that the computational load that is associated with a cue varies as a function of the acquisition of the piece of grammar that is to analyse: recently/not yet acquired aspects of the target grammar will be more burdensome than long consolidated ones.

If the above hypothesis is on the right track, we expect that WO cues will be processed more easily and in a more automatised, adult-like fashion, for word order properties are acquired particularly early in Spanish (Grinstead 1998; 2000; 2004; Bel 2001; 2003 a.o.).[21] On the other hand, DOM has been shown to be acquired only later (Rodríguez-Mondoñedo 2008),[22] so that the (missed) mastery of its grammar can have an interesting reflection on how DOM cues affect children's comprehension.

Concretely, we predict that DOM cues are more costly than WO cues for those children who have acquired DOM, but nonetheless bring about an amelioration effect due to the fact that DOM allows for structural disambiguation. For participants who, instead, have not acquired DOM yet, we foresee two possibilities. The first possibility is that they simply neglect DOM cues, resulting in lack of amelioration effects. Alternatively, they could benefit from DOM cues based on probabilistic biases that associate the sheer presence of the sound *a/al* between the relative head and the relativiser with an ORC reading, as predicted by the aforementioned experience-based accounts to relative clause processing (cf. Section 1 and in particular fn. 3).[23] Note that the results will not only tell which alternative is better supported, but also shed new light on some critical aspects of the theory of locality in general. Let us suppose that DOM cues trigger amelioration effects regardless of whether DOM as a grammatical property has been acquired. In such a scenario, the effectiveness of a given cue would be hardly connected with its underlying grammatical representation, and a reductionist approach to intervention effects would naturally account for the facts. If, instead, ameliorations only arise when DOM is associated with its function in the grammar, then the grammar itself must be acknowledged a crucial role in accounting for amelioration effects. In sum, the acquisition of DOM-grammar is key to the understanding of intervention locality and thus constitutes the core of our third research question:

---

[21] More generally, abstract knowledge of language-specific constraints on constituent ordering has long been acknowledged to be acquired as early as the second year of life (Bloom 1970; Brown 1973; Abbot-Smith et al. 2001; Gavarró et al. 2015 a.o.). See Guasti (2017: ch.4) for a cross-linguistic overview, and Montrul (2004: 190–205; 262–279) for Spanish in particular.

[22] Rodríguez-Mondoñedo found that the differential marker *a* in obligatory contexts is used in a target-like manner by Spanish children by the age of 3. This acquisition is relatively early, although not as early as the mastery of constraints on constituent ordering (see above). Moreover, it remains an open question how and when the complete distribution of DOM is fully mastered. Especially if considering its inherent complexity and variability, scholars generally expect DOM to be difficult to acquire (Mardale & Montrul 2020). Because of the sparsity of research in this respect, we opted to test ourselves the knowledge of DOM of the participants in our study (cf. Section 4.2.3).

[23] It follows that in this scenario only *in-praesentia* cues could trigger amelioration effects.

RQ3: Does the acquisition of the grammar underlying a cue have an impact on its effectiveness?

In the next section, we describe how we gauged participants' acquisition of DOM and illustrate our overall methodology. Then, we will discuss the results and, in developing the above considerations, clarify their import on the broader debate regarding the source of locality.

4 Materials and methods

This study is divided into two main parts. The first part was designed to test the comprehension of SRCs and ORCs by Spanish children. The second part was designed to test whether and to what extent different types of disambiguating cues and their combinations impact on the comprehension of ORCs specifically. In addition, we measured children's mastery of DOM grammar to understand how this impacts on their ability to comprehend ORCs disambiguated by DOM cues alone. Overall, the study comprised a total of three experiments: two sentence-picture-matching tasks and one sentence repetition task.

4.1 Participants

Participants were recruited in a school in the vicinity of Granada (Southern Spain), where a total of 57 children were tested. Of these, 47 monolingual native-speakers of Spanish were eventually considered in the analysis (age range: 4;5–7;1, M = 5;9, SD = 0;8).[24] Participants were arranged into three age groups, as shown in **Table 1**. None of the children analysed in the results had a reported history of speech, hearing, or language disorder.

Age group	No. of participants	Age range	Mean age (*sd*)
4 y.o.	14	4;5–5;3	4;11 (0;3)
5 y.o.	17	5;3–6;3	5;9 (0;4)
6 y.o.	16	6;4–7;1	6;9 (0;3)

Table 1: Participants' demographics per age group.

4.2 Experiments design

All participants participated in all the experiments in two different sessions about a week apart. Each session would feature only one of the two sentence-picture-matching tasks, in randomised order. The sentence-repetition-task was administered either in the first or the second session, also in randomised order. Additionally, we randomised the relative order between the sentence-

[24] We made sure to only test speakers of Peninsular Spanish born and raised in the region. This was done to avoid possible interactions between conflicting DOM systems (cf. fn 13).

picture-matching task and the sentence-repetition-task. A single session would not last more than 30 minutes and children could have a break between the two tasks. Even so, children could ask to pause or terminate the task at any time during the session. Experiment 1 tested the comprehension of SRCs and ORCs. Experiment 2 tested the comprehension of ORCs featuring different types of disambiguating cues. The sentence repetition task tested participants' overall grammatical competence, with a focus on DOM. In what follows we present each of the tasks in turn.

4.2.1 Experiment 1

The stimuli consisted of 24 sentences arranged in a 2 × 1 design with sentence type (SRC, ORC) as an independent factor. All experimental items featured two [human; definite; specific] DPs, serving as the agent and the patient of transitive constructions (see Supplementary Materials). The event described by the verb and its participants were chosen in such a way that all sentences were semantically reversible. SRCs were like (14a), and ORCs like (14b).

(14) a. el niño que saluda al futbolista
the boy that greet.3SG DOM.the footballer
'the boy that greets the footballer'

b. el niño que saluda el futbolista
the boy that greet.3SG the footballer
'the boy that the footballer greets'

Experimental items were divided into two lists and integrated with 12 filler sentences. Each list featured six items per condition, arranged so that children would see each experimental item only once. Fillers were the same across lists. All sentences were recorded by a native speaker of Spanish born and raised in Granada and presented as audio stimuli. Their comprehension was tested through a sentence-picture-matching task along the lines of Friedmann et al. (2009), whereby each item is associated with two pictures, one representing the event described by the item, and the other representing the same event but with inverted agent-patient relation (see **Figure 1**).

Figure 1: Sample picture used in the experiments (© alicelipparini.com).

During the session, children would be wearing headphones and hear the instructions of the task. This was presented as a game in which they would help a little teddy bear answer some questions. Specifically, they were asked to point to the picture described by the stimulus. The introductory question of the experimental items was always as in (15):

(15) Donde esta el niño que saluda el futbolista?
where is the.M.sg boy that greet.3SG the footballer
'Where is the boy that the footballer greets?'

This way the relative head was always the subject of the main sentence, thus invariably introduced by the determiner *el*. This was done to avoid any potential confound/interaction between DOM assigned by the relative clause's verb and that assigned by the main verb.[25] Filler sentences were introduced by (the Spanish translation of) "Show me where the NP V the NP".

An experimenter would press the left or the right arrow key according to children's responses, which would be sent to the server at the end of the task. The task was built on PcIbex (Zehr & Schwarz 2018).

4.2.2 Experiment 2

Experiment 2 follows the exact same procedure as Experiment 1. In this case, though, stimuli were 16 ORCs of the types in (16), where the subject within the relative clause occurs in either pre-verbal (16c,d) or post-verbal (16a,b) position, and the relative head is marked (16b,d) or not (16a,c) by an overt DOM-marker.[26]

(16) a. el niño que saluda el futbolista (**–DOM** ; **post-verbal**)
the boy that greet.3SG the footballer
'the boy that the footballer greets'

b. el niño al que saluda el futbolista (**+DOM** ; **post-verbal**)
the boy DOM.the that greet.3SG the footballer
'the boy that the footballer greets'

c. el niño que el futbolista Saluda (**–DOM** ; **pre-verbal**)
the boy that the footballer greet.3SG
'the boy that the footballer greets'

[25] This is especially relevant for Experiment 2. Indeed, an introductory question like "*Show me the X that the Y verb*", as the one employed in e.g. Friedmann et al. (2009), would result in "*Muéstrame **al** niño **al** que (el futbolista) saluda (el futbolista)*" in sentences like (16b) and (16d) (see below).

[26] In the analysis (see below) we use the labels "–DOM" and "+DOM" instead of *in-absentia* DOM and *in-praesentia* DOM for simplicity.

d. el niño al que el futbolista saluda (+**DOM** ; **pre-verbal**)
the boy DOM.the that the footballer greet.3SG
'the boy that the footballer greets'

Sentences like (16a–d) were arranged in 4 conditions in a 2 × 2 design and integrated with 16 fillers. We then created 4 lists, each featuring a different item per condition, following a Latin Square design. Like in Experiment 1, fillers where the same across lists.

4.2.3 Sentence Repetition Tasks

We used a sentence repetition task (SRT) to assess participants' syntactic knowledge. Available evidence shows that SRTs constitute an effective means to gauge children's overall competence of their target grammar (Armon-Lotem et al. 2015; Klem et al. 2015; Spada et al. 2015; Andreou et al. 2021; Torregrossa et al. 2022). At the comprehension level, SRTs tap into participants' abilities to decode and interpret the stimulus sentences. At the same time, the production phase involves lexical retrieval, grammatical analysis, sentence encoding, and eventually phonological realisation.

We built our SRT based on previous work by Bravo et al. (2020). In total, the task consisted of 35 sentences targeting 43 different structures, some of which were targeted more than once, for a total of 71. Among these we included 9 occurrences of DOM in contexts of increasing syntactic complexity and involving either obligatory or optional DOM. In particular, DOM appears in simple SVO sentences, in WH-object-questions, in SRCs (the head marked as the matrix's object), in clitic-left-dislocated structures. Moreover, DOM is represented by nominals that are respectively (human) proper names, [+human; +specific; +definite], [+human; +specific; –definite], or introduced by a strong quantifier (as in *Llamó a toda chica con sombrero* '(s)he called every girl in a hat').[27]

In the analysis we transcribed participants' answers and coded them according to whether their productions included or not the target structure. Following the methodology employed in Armon-Lotem et al. (2015) and Torregrossa et al. (2022), we assigned 1 point when children accurately repeated the target structure regardless of the accuracy of the entire sentence, and 0 points if they omitted the target structure or substituted it with an alternative structure. To illustrate this, let us consider the stimulus sentence "*A Sofía la vi ayer antes de ir a trabajar*" (*Sofía, I saw her yesterday before going to work*). This sentence targeted the competence of 4 different structures, namely clitic left dislocations (CLLD), the use of DOM with a proper name, temporal adverbials, and non-finite complement clauses introduced by *de*. Each of these would be assigned

[27] See the Supplementary Materials for the complete list of stimuli composing the SRT. In particular, the ones targeting DOM are Items: 2; 22; 23; 24; 25; 26; 29; 31; 35.

either 1 or 0 points. For instance, if a child failed to repeat the verb *ir* but accurately repeated the rest of the sentence, as in e.g. "*A Sofía la vi ayer antes de trabajar*", we would still assign one point in relation to the the CLLD target, the DOM target, and the temporal adverbial target, but 0 points to the non-finite complement clause target "*a trabajar*". Although different analyses have been applied to SRTs, we opted to take into account only the accurate reproduction of the target structure. This procedure has been claimed to tap more precisely into syntactic knowledge than other possible measures (such as those based on verbatim repetitions, grammaticality of the produced sentence as a whole, or omission of function and/or content words) as it is less affected by vocabulary knowledge and working memory (Hamann & Abed Ibrahim 2017).

We extracted two scores. The first one is from 0 to 71 and reflects the number of accurate reproductions of all target structures (henceforth SRT-score). The second one, from 0 to 9, exclusively takes into account the accurate reproductions of DOM target-structures (henceforth DOM-score). Our ultimate purpose was to ensure we had a measure that reflected participants' mastery of the grammar underlying DOM at the time of the experiment. In Section 5 we discuss how the DOM-score in particular is crucial to analyse and interpret the results of Experiment 2.

4.3 Results and analysis

Before presenting the results of Experiment 1 and Experiment 2, we report the descriptives for participants' scores in the SRT and the subpart of the SRT related to the mastery of DOM. Participants' SRT-scores exhibit a range of correct responses between 27 and 70 (M: 58.4, SD = 8.33). As for DOM-scores, the number of correct answers ranges between 0 and 9 (M: 5.81, SD = 1.94). The two scores (SRT-score and DOM-score) are highly correlated with each other ($r(45) = .88$, $p < .001$). Participants' age correlated with both their SRT-scores and DOM-scores ($r(45) = .55$, $p < .001$ and $r(45) = .45$, $p = .002$).

4.3.1 Experiment 1 – SRCs vs ORCs

The bar graph in **Figure 2** shows the proportion of correct answers in association with SRCs and ORCs, respectively. The mean proportion of accurate answers was .92 (SD = .27) for SRCs and .11 (SD = .31) for ORCs.

We used R (R Core Team 2021) and lme4 (Bates et al. 2015) to run a generalised linear mixed-effects model to investigate the extent to which participants' accuracy was dependent on the type of relative (SRC vs. ORC), their age, and their syntactic abilities as measured through the SRT. In particular, we considered response accuracy as dependent variable and the interaction between type of relative clause and age, and SRT-score as predictors. For the type of relative, we considered SRCs as the reference level. We mean-centred the values related to age and SRT-score.

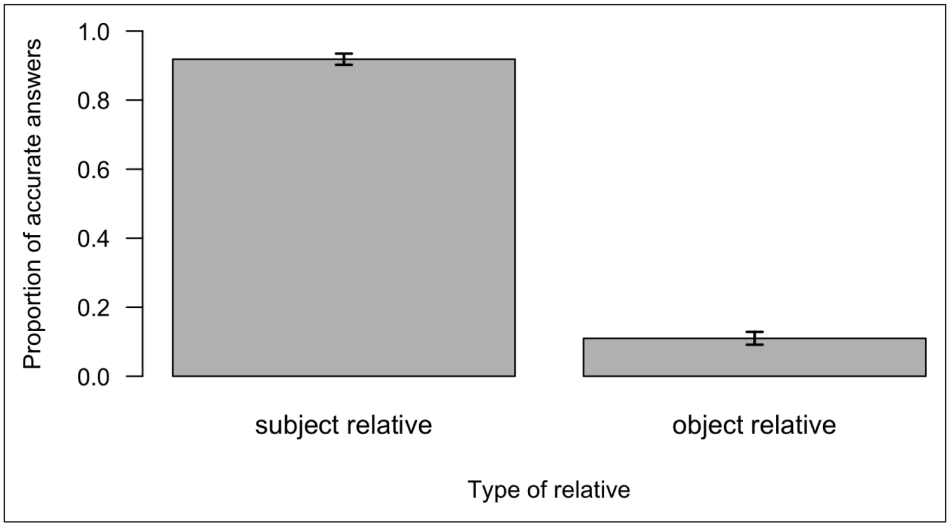

Figure 2: Bar graph of the proportion and standard error of accurate answers with SRCs and ORCs.

We fit the model with random slopes for type of relative by participant.[28] The results reported in **Table 2** revealed that there was a significant lower-order effect of type of relative, indicating that participants were less accurate with ORCs (when age was at its mean value). We also found a significant lower-order effect of age, suggesting that accuracy with SRCs (taken as the reference level in the intercept) increased with age. The significant interaction between type of relative and age indicated that contrary to the pattern observed with SRCs, accuracy with ORCs decreases

Fixed effects	***b***	**SE**	**z**	**p**
Intercept	2.91	0.42	7.01	<.001
Type of relative clause (object)	5.40	0.54	9.96	<.001
Age	0.73	0.32	2.25	.02
SRT score	0.34	0.17	2.01	.04
Type of relative clause (object) * Age	1.54	0.43	3.54	<.001

Table 2: Parameters of the generalised linear mixed-effects analysis with response accuracy as dependent variable and type of relative clause in interaction with age, and SRT-score as fixed effects.

[28] The resulting R model was: m1 ← glmer (accuracy ~ 1 + type of relative * age + SRT-score + (1 + type of relative|ID), data = spanish_relatives, family = "binomial", control = glmerControl(optimizer = "bobyqa")). By running a Likelihood ratio test for model comparison by means of the *anova* function in R, we observed that adding the interaction between age and SRT-score to m1 did not improve the model fit ($\chi^2(3) = 1.67$, p = .64). We also compared a model including the interaction between type of relative clause and SRT-score, and age as main effect (i.e., m2 ← glmer (accuracy ~ 1 + type of relative * SRT-score + age + (1 + type of relative|ID) […]) with the above-mentioned model featuring the three-way interaction between type of relative clause, age and SRT. In this case, the latter model improved the fit ($\chi^2(3) = 10.51$, p = .01). As a result, m1 above was selected for the analysis.

with age (**Figure 3**). Finally, we observed a main effect of the SRT-score, whereby participants with higher syntactic abilities were more accurate in the comprehension of both SRCs and ORCs.

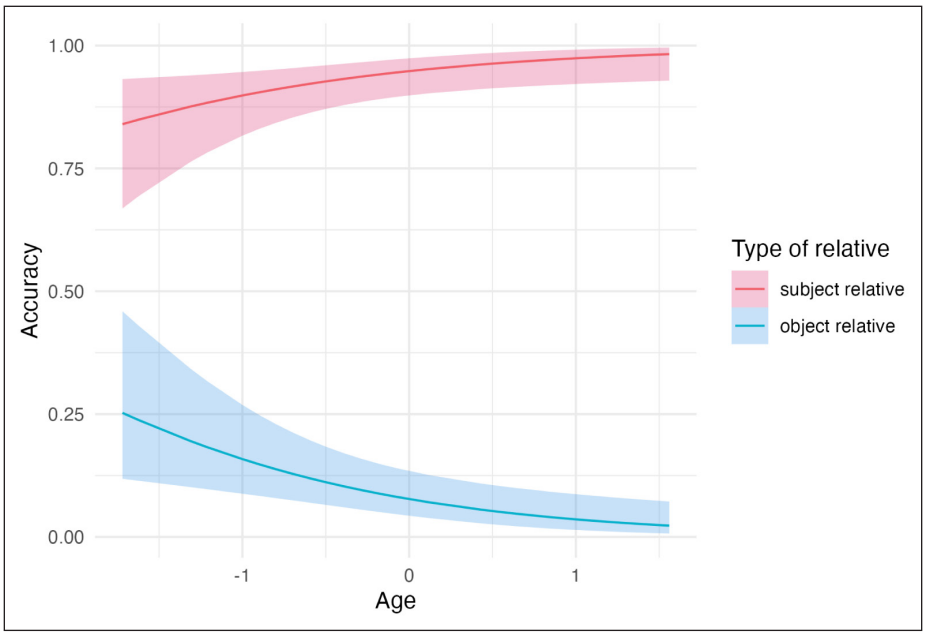

Figure 3: Predicted probability related to response accuracy as a function of type of relative clause (SRC vs. ORC) and participants' age (mean-centred values). The shaded lines indicate a 95% confidence interval. The predicted probabilities have been derived by using the ggpredict() function in the 'ggeffect' package (Lüdecke 2018) and then plotted.

4.3.2 Experiment 2 – ORCs

The bar graph in **Figure 4** shows the proportion of correct answers in association with all types of ORCs, as a function of the position of the subject (post-verbal vs. pre-verbal) and the presence (vs. absence) of overt DOM. The mean proportion of accurate answers with ORCs featuring a post-verbal subject and no overt DOM was .08 (SD = .27), similarly to the results shown in Experiment 1, in which the same type of ORCs was used. The mean proportion of accurate answers with ORCs featuring a post-verbal subject and overt DOM was .22 (SD = .42). With ORCs featuring a pre-verbal subject response accuracy was higher, reaching .67 (SD = .47) with ORCs with no overt DOM, and .48 (SD = .50) when DOM was overt. We mean-centred the values related to age and DOM-score. We fit the model with random slopes for subject position by participant.[29] We ran a generalised linear mixed-effects model to investigate the extent to

[29] The resulting R model was: m1 ← glmer (accuracy ~ 1 + subject position * DOM * (DOM-score + age) + (1 + subject position|ID), data = spanish_relatives, family = "binomial", control = glmerControl(optimizer = "bobyqa")). We did not consider the interaction between DOM-score and age because four-way interactions are notoriously difficult to interpret. Moreover, we had no hypotheses related to this interaction. We did not consider random slopes for presence (vs. absence) of DOM by participant due to convergence issues.

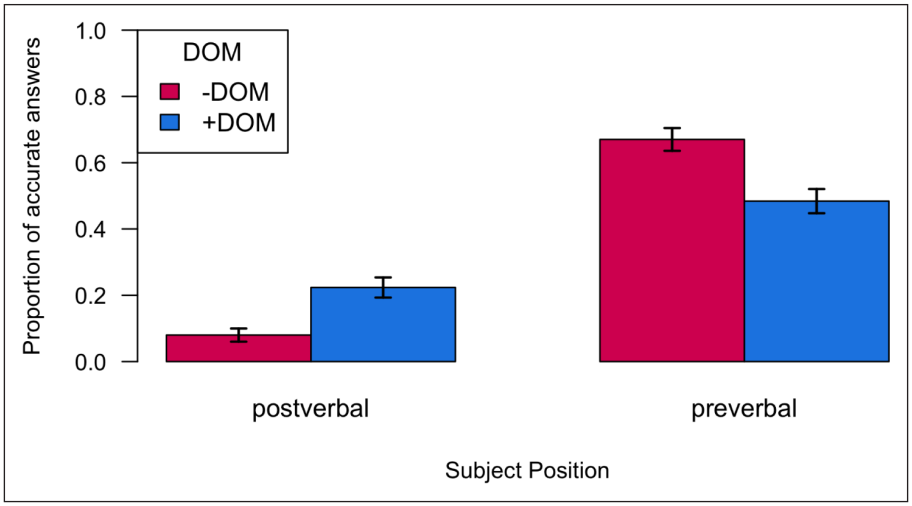

Figure 4: Bar graph of the proportion and standard error of accurate answers with ORCs as a function of the position of the subject constituent (pre-verbal vs. post-verbal) and the presence (vs. absence) of overt DOM-marking.

which participants' accuracy in the comprehension of ORCs was dependent on the position of the subject (pre-verbal and post-verbal), the presence (vs. absence) of overt DOM, participants' age and performance in the sub-test of the SRT related to the mastery of DOM (i.e. their DOM-score). We did not consider the SRT-score in this case due to the high correlation between the DOM-score and the SRT-score (see above). Moreover, the consideration of the DOM-score is relevant for understanding whether (possible) ameliorating effects of DOM in the comprehension of ORCs are related to the acquisition of DOM. For the type of relative, we considered ORCs with post-verbal subjects and no overt DOM as the reference level.

The results reported in **Table 3** revealed a significant lower-order effect of the presence of overt DOM: participants were more accurate in the comprehension of ORCs with post-verbal subjects featuring overt DOM than ORCs with post-verbal subjects with no overt DOM, when age and DOM-score were at their mean values. The significant lower-order effect of subject position indicated that among the ORCs with no DOM, participants tended to be more accurate with the ones featuring pre-verbal subjects. However, the significant interaction between overt DOM and subject position indicated that among the ORCs with pre-verbal subjects, response accuracy decreased if the ORC exhibited overt DOM. We also found a significant lower-order effect of age, which replicated the pattern observed in Experiment 1, whereby older children were less accurate with ORCs with post-verbal subjects and no overt DOM. Finally, we observed a significant three-way interaction between DOM, subject position, and DOM-score, which suggested that response accuracy with ORCs with pre-verbal subjects and overt DOM decreased with increasing DOM-scores. This pattern is shown in **Figure 5**. On the one hand, mastery of DOM – as measured by the DOM-score – led to better performance with ORCs with post-verbal subjects. In this case, the

Fixed effects	***b***	**SE**	**z**	**p**
Intercept	3.00	0.41	7.33	<.001
DOM (+DOM)	1.61	0.42	3.90	<.001
Subject position (pre-verbal)	3.76	0.44	8.62	<.001
DOM score	0.18	0.30	0.58	.57
Age	0.91	0.40	2.277	.02
DOM (+DOM) * Subject position (pre-verbal)	2.45	0.47	5.16	<.001
DOM (+DOM) * DOM score	0.51	0.35	1.46	0.15
DOM (+DOM) * Age	0.70	0.43	1.61	0.11
Subject position (pre-verbal) * DOM score	0.47	0.35	1.35	0.18
Subject position (pre-verbal) * Age	0.80	0.43	1.84	.07
DOM (+DOM) * Subject position (pre) * DOM score	0.97	0.43	2.25	.02
DOM (+DOM) * Subject position (pre-verbal) * Age	0.68	0.50	1.34	.18

Table 3: Parameters of the generalised linear mixed-effects analysis with response accuracy in the comprehension of ORCs as the dependent variable and the interaction between subject position, presence of DOM, and age, on the one hand, and DOM-score, on the other hand, as predictors. Significant results are in bold.

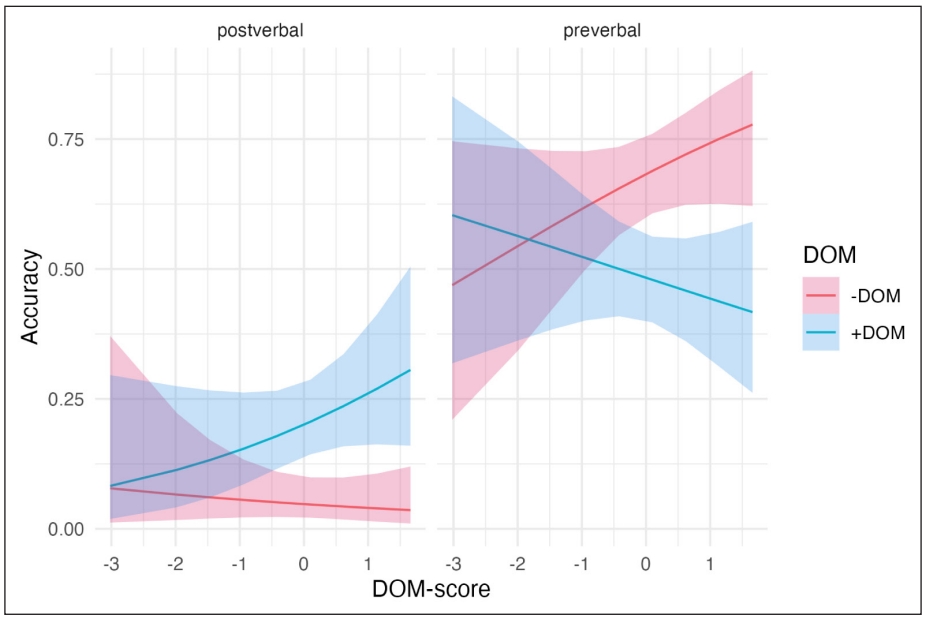

Figure 5: Predicted probability related to response accuracy with ORCs as a function of subject position (pre-verbal vs. post-verbal), presence or absence of DOM and participants' mastery of DOM (DOM-score; mean-centred values). The shaded lines indicate a 95% confidence interval. The predicted probabilities were derived with the ggpredict() function in the 'ggeffect' package (Lüdecke 2018) and then plotted.

corresponding results in the model are not significant but the tendency was as expected (see the positive estimate in association with the interaction between presence of DOM and DOM-score). On the other hand, response accuracy with ORCs with pre-verbal subjects seemed to be affected negatively by participants' mastery of DOM.

5 Discussion

The results of our first experiment and their statistical interpretation unequivocally reveal that SRCs are much easier than ORCs for Spanish children to comprehend. This appears to hold true independently of the type of ORC considered, as confirmed by the fact that even the condition that reached the highest proportion of accurate answers in Experiment 2 was far below the performance obtained with SRCs.[30] Thus, as expected, a subject-object asymmetry in children's comprehension of relative clauses holds true for Spanish, much as in previously tested languages (cf. Section 2). This answers our first research question, which we repeat here:

RQ1: *Is there a subject-object asymmetry in Spanish children's comprehension of relative clauses?*

Spanish children comprehend SRCs significantly better than ORCs, expanding the evidence of a cross-linguistic asymmetry between subjects and objects in relativisation.

We additionally found that older children, as well as children with higher syntactic abilities performed better with SRCs.[31] Somewhat more puzzling is the observed interaction between age and type of relative clause, which was also replicated in Experiment 2 (cf. **Figure 3** and **Table 3**). In particular, it is unexpected that older children perform worse than younger ones in the comprehension of ORCs with post-verbal subjects and *in-absentia* DOM cues. One could argue that younger children show a lesser degree of commitment and resort to guessing more frequently than older children, who rather seem to favour the (wrong) SRC-reading more consistently. If so, the accuracy rates of the latter would be lower as they experience garden path-related errors in a more adult-like fashion as discussed in Section 3. Still, this interpretation is at odds with the fact that the great majority of the children ($n = 45$) only gave 0 or 1 accurate answers out of the 4 items corresponding to this particular condition (cf. Table 6 in the Supplementary Materials for a visualisation of children's response patterns across conditions). Another possibility is that the emerging pattern stems from a classic instance of U-shape, whereby the mastery of a specific category is subject to a temporary regression before progressing again. Assessing this hypothesis

[30] Note, however, that we must be cautious in pursuing direct comparison across experiments, even though participants were the same. A more reliable evaluation of how SRCs compare to the four types of ORCs employed in Experiment 2 would necessitate a dedicated experiment incorporating all these conditions together. We avoided venturing this option because we feared children, particularly 4 year-olds, would be overwhelmed by the length of the task.

[31] Age and syntactic competence naturally tend to go hand in hand. In our case, this is specifically borne out by the reported correlation between SRT-scores and participants' age (cf. Section 4.3).

would, of course, require testing older children. However, we leave this aspect of our results open to further interpretation.

Back to the main finding, the fact that SRCs are understood better than ORCs is surely not unexpected. In fact, a theory of intervention locality like Relativised Minimality explicitly predicts such an outcome: a disruption arises in the integration of configurations where two structural positions that are linked by a syntactic dependency are separated by an intervening constituent. Within such a framework, intervention is defined in terms of c-command, and the intervener needs to be syntactically similar to the target of the dependency. Differently from SRCs, ORCs represent a case of critical intervention configuration: the subject structurally intervenes between the relative head and the internal argument of the relative clause, which are linked by a syntactic dependency. Hence the asymmetry between SRCs and ORCs.

Relativised Minimality not only offers a neat account for intervention effects, but also provides an elaborated set of predictions of when these are weakened. To iterate, the degree of disruption is defined as a function of the featural distinctness between the target (here the relative head) and the intervener (here the subject), where: a) the distinctness is computed based on the set-theoretic relations between the features of the relevant syntactic objects, and b) only syntactically active features enter such computation. In other words, a mismatch in relevant features between the subject and the object should trigger an amelioration effect and ease children's comprehension of ORCs. If we look at our results, however, it is unclear whether Relativised Minimality's predictions are entirely met. To see why, let us recapitulate some crucial aspects that emerged from the results of Experiment 2.

We found that DOM ameliorates Spanish ORCs, but only when it is overtly realised, for *in-absentia* DOM does not aid children's comprehension. Indeed, although children's accuracy is fairly low even when DOM is overt, the latter clearly ameliorates participants' performance as compared with ORCs featuring *in-absentia* DOM and a post-verbal subject. Another determining factor that emerges from the data is WO: when the subject within the relative clause occurs pre-verbally children's comprehension strongly increases. Thus, both *in-praesentia* DOM cues and WO cues in isolation bring about an amelioration, with the latter being by far the most effective ones as they generate much higher performances. Crucially, though, when *in-praesentia* DOM and WO cues are concurrently present in the same sentence, children's accuracy significantly decreases.

Now, back to Relativised Minimality, is DOM actually predicted to constitute an ameliorating factor? If DOM is treated as a case marker (as suggested in e.g. Bossong 1985; Brugè & Brugger 1996; Aissen 2003),[32] it should not fall within the definition of syntactically active features and thus should be excluded from the set of ameliorating cues/features (cf. section 2 and the sources cited therein). This is, for that matter, what Bentea (2012; 2016) and Sevcenco & Avram

[32] For a discussion, see Fábregas (2013).

(2012) conclude for Romanian, where DOM seems to not trigger a clear amelioration effect in ORCs.[33] The fact that Spanish DOM does ease ORCs' comprehension is then problematic for such a framework. Another potentially puzzling aspect of our results is that WO is characterised as an ameliorating cue. Why would pre-verbal subjects help children's comprehension under a Relativised Minimality perspective? A possible interpretation is that such subjects are specified with a [FOCUS] feature (or, more in general, an information-structure related one) that is responsible for their raising to the pre-verbal position. This way, the target and the intervener would bear distinct sets of relevant features, accounting for the observed amelioration.[34] Still, a particularly critical problem arises if we consider the third main finding of our experiment, namely the fact that when DOM and WO are simultaneously present children's comprehension decreases. Why would two cues that trigger ameliorations when occurring in isolation constitute an impediment as soon as they are realised together? If anything, their concurrent presence should strengthen the distinctness of the target and the intervener and actually boost even better performances. Or, in the worst case, these sentences should be at least as well-comprehended as those with only one WO cue. Again though, what we see is that the simultaneous presence of two cues hinders children's integration of ORCs, which cannot be straightforwardly made sense of calling upon (just) Relativised Minimality.

As a matter of fact, a closer look at the data opens an alternative and seemingly plainer interpretation. Indeed, our results are quite naturally accounted for if we take into account general principles of sentence processing and language acquisition. The fact that *in-absentia* DOM does not trigger an amelioration effect, for instance, is substantially expected given the nature of this type of cue. Independent evidence shows that covert elements are challenging for children (Biberauer & Roberts 2012; 2015; Crisma et al. 2020 and references therein). Therefore, it is likely that *in-absentia* cues are not robust enough, especially as compared to overt ones. Arguably, then, children cannot build upon the information conveyed by the latter and, thus, are unable to disambiguate the structure. This would explain why ORCs like (16a) are consistently assigned a SRC-reading, which is, all else being equal, the favoured/default interpretation.[35] In addition, these ORCs likely constitute a case of garden-path sentence, where the disambiguation

[33] In this regard, we must underline that Romanian DOM and Spanish DOM are not entirely comparable. Albeit sharing similar syntactic behaviours, especially in the context of ORCs, a crucial difference between the two is that Romanian DOM is not strictly obligatory. In spoken language, the DOM particle *pe* is actually quite consistently omitted (Guțu Romalo 2000; Sevcenco & Avram 2012; Bentea 2016).

[34] Note, however, that this analysis may require partial revision if we subscribe to Gutiérrez-Bravo's (2005) claim that pre-verbal subjects in Spanish ORCs are topics rather than foci. Indeed, [TOPIC] features form "*a class of its own* […], *so that* [they] *do not trigger minimality effects on operator chains nor are they affected by intervening operators*" (Rizzi 2018: 344).

[35] This is true at least for Indo-european languages. The question of whether there exists a universal subject advantage in relativisation is debated. See Lau & Tanaka (2021) for a comprehensive review of the literature in this regard.

can only be carried out as the last NP is analysed. Considering that this causes a significant slow-down in adults' processing (cf. section 2), it is understandable that children also struggle with this condition. In fact, a different result would have been very surprising.

Another aspect of our results that can be reasonably ascribed to processing principles is the decreased comprehension with ORCs disambiguated by two cues at once. In sentences like (16d), the SRC-reading is banned by both subject position and overt DOM, yet children's accuracy gets lower as compared to that of ORCs disambiguated by just WO. We contend that this outcome is the reflection of working memory (WM) limitations affecting the child parser. Under this view, each grammatical atom is associated with a certain computational cost that weighs on the parser. Cues like DOM and WO are of course no exception and can thus conceivably lead to a WM-overload when simultaneously present. This effect might be even more evident when children are faced with demanding structures like ORCs, which assuredly constitute an already burdensome base for the parser to operate on. If this is on the right track, the fact that cues only produce ameliorations when occurring alone immediately ensues. The reasoning is the following: the integration of ORCs is a demanding task, but can be alleviated via morphosyntactic cues like those in question. These, however, besides favouring the disambiguation of the structure, load the parser with additional material to analyse. Therefore, their effect is beneficial inasmuch as their computational cost counterweights that of, say, intervention effects. If too many cues occur, the parser can suffer from an exceeding load, resulting in poorer comprehension.

Note that, within this perspective, the fact that WO and DOM (in isolation) bring about remarkably different accuracy rates (cf. **Figure 4**) is actually a welcome result, one that confirms the hypothesis we explored in Section 3. As discussed therein, consolidated grammatical properties are taken to be processed more easily and in a mostly automatised fashion. Conversely, recently acquired aspects of the target grammar require a greater amount of resources (as the parser is more receptive towards newer information). Because WO properties are acquired early (see above), it makes perfect sense that WO cues represent the most effective means of amelioration: they disambiguate the structure without weighing too much on the parser. DOM, instead, is acquired later and arguably weighs more on the sentence-analyser. In other words, the facilitative effect of a cue reflects its timing of acquisition (Tsimpli 2014; Schulz & Grimm 2018; Listanti & Torregrossa 2023). Further support for this interpretation is provided by the data we observed with adults (cf. Supplementary Materials). There, the reaction times associated with ORCs featuring DOM and WO simultaneously were even slightly lower than those of ORCs featuring DOM or WO alone. This naturally follows from the fact that adults have long acquired DOM-grammar, whose integration is then as easy and automatised as different properties like, for instance, constituents' ordering.

At this point, we can answer our second research question:

RQ2: *Do DOM and WO cues ameliorate the comprehension of ORCs by Spanish-speaking children? Do these cues interact in any way? Is there a difference between in-absentia and in-praesentia DOM cues?*

- Both DOM and WO cues ameliorate Spanish children's comprehension of ORCs, with the latter triggering appreciably higher accuracy.
- An interaction between the two is observed because DOM enhances children's comprehension when it occurs in isolation, but hinders it when it co-occurs with WO cues.
- The distinction between *in-absentia* and *in-praesentia* DOM cues does make a difference, as the latter produce significantly better perfomances.

Our third research question was about the impact of the acquisition of a cue's underlying grammar on its effectiveness. In other words, we wondered whether the ameliorating capacities of a cue are related to the knowledge of its particular grammar. To answer this last point we can look at the results of the SRT presented in section 4.3, where we reported a three-way interaction between overt DOM, WO, and DOM-score. In **Figure 5** we showed that the effect of (*in-praesentia*) DOM cues is a function of DOM's acquisition: as children's mastery of DOM increases, their accuracy improves when dealing with isolated DOM cues, and declines when these cues are concurrent with WO cues. In plain words, the impact of DOM cues (be it positive or negative) only emerges with children who *know* that an *a/al* particle in front of a [human; definite; specific] NP indicates that the latter is a direct object. If such knowledge is still missing, the child parser simply neglects the DOM morphemes. We can then provide an answer to our last research question:

RQ3: *Does the acquisition of the grammar underlying a cue have an impact on its effectiveness?*

> The level of mastery of DOM grammar determines whether and to what extent *in-praesentia* DOM cues impact on the comprehension of Spanish ORCs. This suggests that morphosyntactic cues are only effective when acquired.

That being the case, a rather inescapable consequence is that the grammar must be attributed a quite determinant role: without the relevant grammatical knowledge, morphosyntactic cues are virtually irrelevant. This conclusion is far from being trivial. As a matter of fact, the identification of such a key role of grammar is downright essential to the overall interpretation of our results. To see why, let us briefly summarise what we have said so far. We maintained that, as far as Experiment 2 is concerned, an account based on Relativised Minimality, which fully modulates intervention locality within the grammar, is not unproblematic. Without some ad-hoc revisions, indeed, the calculation of the strength of intervention effects in Relativised Minimality terms cannot predict the observed results. We also contended that an approach that looks at non-strictly

grammatical aspects of our cognitive system (e.g. computational resources, WM-limitations, parser's receptiveness) seems to be more compatible with our findings. At this point, the question arises as to what import these considerations might have on the broader enquiry on locality. As already mentioned in the introduction, a long-standing debate persists about the source of locality effects in the human language. So-called grammar-based approaches argue that the syntax or, more generally, the grammar is responsible for emergence of these effects. On the other hand, processing-based or "reductionist" theories account for the same facts by assigning a crucial role to the performance system. So how can the data of our study contribute to this debate? Well, the question of the knowledge of the grammar underlying a morphosyntactic cue is, in this respect, a central one. In a way, to understand the role of the acquisition of a cue's grammar is to understand the role of grammar itself. Because, in our case, DOM only triggers an amelioration effect when its particular grammar has been acquired, we can deduce that cues' effectiveness is dependent on, and tightly linked to their function within the grammatical system. If, on the other hand, DOM cues were found to be relevant irrespective of such an acquisitional factor, we would conclude that the grammar does not play a pivotal role in the alleviation of intervention locality. Now, we said that the amelioration effects in Experiment 2 could be naturally derived from independent principles of our cognitive system. A fact that taken as such lends support to reductionist theories. At the same time, though, we just illustrated that since morphosyntactic cues need to be connected with an acquired grammatical function (being otherwise ineffective), evidence is there in favour of a grammar-based approach to locality, namely one that appoints the grammar as the origin and regulator of locality constraints.

In sum, the results of Experiment 2 and those of the SRT, put together, seem to point to opposite directions if interpreted through the lens of the processing vs. grammar dichotomy that informs the debate on the source of locality. In spite of this apparent contrast, we argue that our findings need not be taken as conflicting evidence. Rather, it is our contention that they naturally open to a third theoretical stance, one where the mechanisms driving ameliorations to intervention-locality are neither entirely regulated by the grammar nor completely independent from it. That is to say, these mechanics reside at the interface between the grammar and the performance system and are thus predicted to be somehow affected by an interaction of the two. To iterate the point, we could say that both language-specific and language-independent factors contribute to the surface ameliorations observed in Experiment 2, and that the strategies responsible for amelioration effects have a twofold nature: on the one hand, they are driven by processing mechanisms, on the other, they hinge on purely grammatical representations. The need to abide by the constraints on the sentence-processor accounts for the impact of, for instance, WM-limitation. The centrality of grammar instead explains why these mechanisms operate exclusively on acquired linguistic material. In this light, we believe we need to orient ourselves towards an account that naturally comprise this "double nature". Note that this need

not be done through the rejection of current theories *in toto*. On the contrary, we uphold and strengthen specific aspects of them in moulding a third, intermediate analysis/hypothesis.[36] We hold on to Relativised Minimality, for instance, in pursuing the idea that "*the ingredients of the computation, and of the calculation of locality in particular, remain inextricably linked to language-specific properties*" (Rizzi 2013: 184). At the same time, however, we eschew the whole set-theoretic apparatus of grammatically-encoded principles that Relativised Minimality builds upon in favour of, we believe, "lighter" assumptions.[37] In this particular regard, we rather follow a typical reductionist perspective and contend that the machinery that drives the computation of (ameliorations to) locality can be straightforwardly derived from non-task-specific principles, namely general constraints on human cognition.

It remains an open question whether the hypothesis of an interaction between the grammar and performance systems can be expanded to other phenomena in the realm of locality theory. And the issue of the source of locality effects would undoubtedly be at the centre of such endeavour. For sure, further enquiry is needed to elaborate this line of reasoning, but we can already say that it would be somehow desirable to confirm that what originates locality effects belongs to the same interface system that drives their ameliorations.[38] If true, not only amelioration strategies, but also locality proper could be construed as an interface phenomenon. We hope to further develop these hypotheses in future work.

6 Conclusions

In this study we tested the comprehension of SRCs and ORCs by Spanish monolingual children. Our results provide novel evidence that the long-observed subject-object asymmetry in child comprehension of relative clauses holds true for Spanish. Moreover, by testing different types of ORCs we were able to determine that both overt DOM-marking and WO properties (i.e. the subject position within the relative clause) constitute ameliorating factors in the comprehension of ORCs. These results, paired with available evidence from the vast literature on children's comprehension of relative clauses, corroborated our descriptive generalisation regarding amelioration effects: it is only when a disambiguation between SRC- and ORC-readings is available that ameliorations arise, and the morphosyntactic properties that are responsible for the disambiguation qualify as ameliorating cues.

---

[36] On the prospect of a "peaceful co-existence" between structural and non-structural approaches to intervention locality see also Adani et al. (2017).

[37] It is not merely the desire to achieve a more minimal grammar that keeps us from fully embracing the entire set of Relativised Minimality's assumptions. We have also illustrated that, in its current formulation, the set of rules underlying RM-computations fails to predict some of the alleviations observed in the literature, including our own.

[38] In this regard, many have suggested that alleviations to island effects offer a revealing perspective on the very nature of locality (Merchant 2001; 2008; Lasnik 2001; Boeckx 2003; 2008a; 2012).

Spanish DOM and WO cues are not equally effective, however. Children proved to be more sensitive to WO properties than DOM-marking, with pre-verbal subjects bringing about better accuracy rates than overt DOM. Even more strikingly, we showed that these cues interact when occurring together: children's comprehension decreases when ORCs with a pre-verbal subject also feature an overt DOM-marker. We additionally measured children's knowledge of the grammar underlying DOM through an ad-hoc SRT and found that DOM only proves to be an ameliorating cue with children who have acquired it. We interpreted our results as evidence for both processing-oriented theories and grammar-based accounts to intervention locality. While the interaction between DOM and WO is immediately explained as an effect of WM-overload, the fact that cues need to be associated with an acquired grammatical representation inevitably ties amelioration effects to language-specific factors. We proposed that this apparent contrast is actually predicted if the strategies at the base of amelioration effects are regulated at the interface between the grammar and the performance system. In this scenario, both domain-specific and domain-general factors are expected to contribute to the resolution of so-called intervention effects, which is, as discussed in Section 5, exactly what our findings suggest.

Although we are aware that an interface-based approach as the one sketched here is not (yet) completely immune to criticism, it is our firm conviction that this type of explanations represents a promising way to capture the multi-faceted nature of locality effects. A position, this, that finds support in the very premises of the minimalist programme, which openly favours the effort to achieve the "easiest possible grammar" through the substitution, when possible, of ad-hoc syntactic rules with domain-general principles. In this light, the long-standing dichotomy between grammatical and reductionist approaches to locality can be abandoned in favour of an intermediate position that integrates the power and predictions of both theories, as many scholars have recently intimated (cf. Presotto 2024a for a discussion). We leave the detailed description of such an interface system to future research.

Data availability

A folder with our supplementary materials can be found here.

Ethics and consent

This study was approved by the Research Ethics Committee of the University of Granada (Comité de Ética en Investigación de la Universidad de Granada). Project number: PID2020-113818GB-I00. Ethics approval reference number: 1794/CEIH/2020.

Funding information

This research was funded by the Research Training Group 'Nominal Modification' (DFG Project nr. 244436322).

Acknowledgements

We are particularly grateful to Natalia Bravo, Miguel Lázaro, and Sonia Mariscal for sharing the material of their Sentence Repetition Task, and to Cristóbal Lozano, Teresa Quesada, Elena García-Guerrero, and Jorge Montaño for their indispensable help in the preparation and realisation of the experiments. Our gratitude also goes to Theresa Biberauer, Maria Teresa Guasti, and Maria Polinsky for some very valuable insights. Finally, we thank four anonymous reviewers for carefully reading our manuscript and providing many helpful comments. All errors are our own.

Competing interests

The authors have no competing interests to declare.

Author contributions

Giacomo Presotto: Conceptualisation, Software, Investigation, Data Curation, Writing – Original Draft (Sections 1, 2, 3, 4, 5, 6), Writing – Review & Editing, Visualisation.

Jacopo Torregrossa: Conceptualisation, Methodology, Formal Analysis, Data Curation, Writing – Original Draft (Section 4), Writing – Review & Editing, Visualisation, Supervision.

References

Abbot-Smith, Kirsten & Lieven, Elena & Tomasello, Michael. 2001. What preschool children do and do not do with ungrammatical word orders. *Cognitive Development* 16(2). 679–692. DOI: https://doi.org/10.1016/S0885-2014(01)00054-5

Adani, Flavia & Stegenwallner-Schütz, Maja & Niesel, Talea. 2017. The peaceful co-existence of input frequency and structural intervention effects on the comprehension of complex sentences in German-speaking children. *Frontiers in Psychology* 8. DOI: https://doi.org/10.3389/fpsyg.2017.01590

Adani, Flavia & van der Lely, Heather K. J. & Forgiarini, Matteo & Guasti, Maria Teresa. 2010. Grammatical feature dissimilarities make relative clauses easier: A comprehension study with Italian children. *Lingua* 120(9). 2148–2166. DOI: https://doi.org/10.1016/j.lingua.2010.03.018

Aissen, Judith. 2003. Differential Object Marking: Iconicity vs. Economy. *Natural Language & Linguistic Theory* 21(3). 435–483. DOI: https://doi.org/10.1023/A:1024109008573

Andreou, Maria & Torregrossa, Jacopo & Bongartz, Christiane. 2021. Sentence repetition task as a measure of language dominance. In Dionne, Danielle & Vidal Covas, Lee-Ann (eds.), *Proceedings of the 45th annual Boston University Conference on Language Development*, 14–25.

Armon-Lotem, Sharon & de Jong, Jan & Meir, Natalia. 2015. *Assessing multilingual children: Disentangling bilingualism from language impairment*. Multilingual Matters. DOI: https://doi.org/10.21832/9781783093137

Arosio, Fabrizio & Yatsushiro, Kazuko & Forgiarini, Matteo & Guasti, Maria Teresa. 2012. Morphological information and memory resources in children's processing of relative clauses in German. *Language Learning and Development* 8(4). 340–364. DOI: https://doi.org/10.1080/15475441.2011.634691

Arregi, Karlos. 1998. *Spanish el que relative clauses and the Doubly Filled COMP Filter*. Unpublished manuscript.

Baddeley, Alan D. & Hitch, Graham. 1974. Working memory. In Bower, Gordon H. (ed.), *Psychology of learning and motivation*, vol. 8, 47–89. Academic Press. DOI: https://doi.org/10.1016/S0079-7421(08)60452-1

Bates, Douglas & Mächler, Martin & Bolker, Ben & Walker, Steve. 2015. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67. 1–48. DOI: https://doi.org/10.18637/jss.v067.i01

Bel, Aurora. 2001. *Teoria lingüística i adquisició del llenguatge: anàlisi comparada dels trets morfològics en Català i en Castellà* (Biblioteca filològica 44). Barcelona: Institut d'Estudis Catalans.

Bel, Aurora. 2003. The syntax of subjects in the acquisition of Spanish and Catalan. *Probus* 15(1). 1–26. DOI: https://doi.org/10.1515/prbs.2003.003

Belletti, Adriana & Friedmann, Naama & Brunato, Dominique & Rizzi, Luigi. 2012. Does gender make a difference? Comparing the effect of gender on children's comprehension of relative clauses in Hebrew and Italian. *Lingua* 122(10). 1053–1069. DOI: https://doi.org/10.1016/j.lingua.2012.02.007

Belletti, Adriana & Rizzi, Luigi. 2013. 11 Intervention in grammar and processing. In Caponigro, Ivano & Cecchetto, Carlo (eds.), *From grammar to meaning: the spontaneous logicality of language*, 294. DOI: https://doi.org/10.1017/CBO9781139519328.015

Bentea, Anamaria. 2012. Does "Case" matter in the acquisition of relative clauses in Romanian? *BUCLD 36 Online Proceedings Supplement* 12. https://www.bu.edu/bucld/files/2012/07/Bentea-36.pdf.

Bentea, Anamaria. 2016. *Intervention effects in language acquisition: The comprehension of A-bar dependencies in French and Romanian*: University of Geneva dissertation.

Bentea, Anamaria & Durrleman, Stephanie. 2017. Now you hear it, now you don't: Number mismatch in the comprehension of relative clauses in French. In LaMendola, Maria & Scott,

Jennifer (eds.), *Proceedings of the 41st annual Boston university conference on language development*, 60–73. Somerville, MA: Cascadilla Press. https://www.lingref.com/bucld/41/BUCLD41-05.pdf.

Bentea, Anamaria & Durrleman, Stephanie & Rizzi, Luigi. 2016. Refining intervention: The acquisition of featural relations in object A-bar dependencies. *Lingua* 169. 21–41. DOI: https://doi.org/10.1016/j.lingua.2015.10.001

Berwick, Robert C. & Chomsky, Noam. 2016. *Why only us: Language and evolution*. MIT Press. DOI: https://doi.org/10.7551/mitpress/9780262034241.001.0001

Betancort, Moisés & Carreiras, Manuel & Sturt, Patrick. 2009. Short article: The processing of subject and object relative clauses in Spanish: An eye-tracking study. *Quarterly Journal of Experimental Psychology* 62(10). 1915–1929. DOI: https://doi.org/10.1080/17470210902866672

Bever, Thomas G. 1970. The cognitive basis for linguistic structures. In Hayes, John R. (ed.), *Cognition and the development of language*, 279–362. New York: Wiley.

Biberauer, Theresa. 2019a. Children always go beyond the input: The Maximise Minimal Means perspective. *Theoretical Linguistics* 45(3–4). 211–224. DOI: https://doi.org/10.1515/tl-2019-0013

Biberauer, Theresa. 2019b. Factors 2 and 3: Towards a principled approach. *Catalan Journal of Linguistics*, 45–88. DOI: https://doi.org/10.5565/rev/catjl.219

Biberauer, Theresa & Roberts, Ian. 2012. Towards a parameter hierarchy for auxiliaries: Diachronic considerations. *Cambridge occasional paper in linguistics* 6(9). 267–294. https://www.mmll.cam.ac.uk/files/copil_6_9_biberauerroberts.pdf.

Biberauer, Theresa & Roberts, Ian. 2015. Rethinking formal hierarchies: A proposed unification. *Cambridge occasional paper in linguistics* 7(1). 1–31. https://www.mmll.cam.ac.uk/files/copil_7_1_biberauerroberts.pdf.

Bloom, Lois. 1970. Language development: Form and function in emerging grammars. DOI: https://doi.org/10.7916/D8S75GT1

Boeckx, Cedric. 2003. *Islands and chains: Resumption as stranding*. John Benjamins Publishing. DOI: https://doi.org/10.1075/la.63

Boeckx, Cedric. 2008a. *Bare Syntax*. Oxford University Press.

Boeckx, Cedric. 2008b. Islands. *Language and Linguistics Compass* 2(1). 151–167. DOI: https://doi.org/10.1111/j.1749-818X.2007.00043.x

Boeckx, Cedric. 2012. *Syntactic Islands* (Key Topics in Syntax). Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9781139022415

Bornkessel, Ina & Schlesewsky, Matthias. 2006. The extended argument dependency model: A neurocognitive approach to sentence comprehension across languages. *Psychological Review* 113(4). 787–821. DOI: https://doi.org/10.1037/0033-295X.113.4.787

Bossong, Georg. 1985. *Empirische Universalienforschung: Differentielle Objektmarkierung in den neuiranischen Sprachen*. Tübingen: Narr. DOI: https://doi.org/10.5281/zenodo.4697660

Bossong, Georg. 1991. Differential Object Marking in Romance and beyond. In Wanner, Dieter & Kibbee, Douglas A. (eds.), *New Analyses in Romance Linguistics: Selected papers from the Linguistic Symposium on Romance Languages XVIII, Urbana-Champaign, April 7–9, 1988* (Current Issues in

Linguistic Theory), 143. John Benjamins Publishing Company. DOI: https://doi.org/10.1075/cilt.69.14bos

Bravo, Natalia & Lázaro, Miguel & Mariscal, Sonia. 2020. A Sentence Repetition Task for early language assessment in Spanish. *The Spanish Journal of Psychology* 23. e39. DOI: https://doi.org/10.1017/SJP.2020.43

Brown, Esther L. & Rivas, Javier. 2011. Subject-verb word order in Spanish interrogatives: A quantitative analysis of Puerto Rican Spanish. *Spanish in Context* 8(1). 23–49. DOI: https://doi.org/10.1075/sic.8.1.02bro

Brown, Roger. 1973. *A first language*. Cambridge, MA: Harvard University Press.

Brucart, José M. 1992. Some asymmetries in the functioning of relative pronouns in Spanish. *Catalan Working Papers in Linguistics* 1(2). 113–143. https://raco.cat/index.php/CatalanWP/article/view/74011.

Brugè, Laura & Brugger, Gerhard. 1996. On the accusative a in Spanish. *Probus* 8(1). 1–52. DOI: https://doi.org/10.1515/prbs.1996.8.1.1

Chomsky, Noam. 2005. Three factors in language design. *Linguistic Inquiry* 36(1). 1–22. DOI: https://doi.org/10.1162/0024389052993655

Chomsky, Noam. 2017. The language capacity: Architecture and evolution. *Psychonomic Bulletin & Review* 24(1). 200–203. DOI: https://doi.org/10.3758/s13423-016-1078-6

Chomsky, Noam & Gallego, Ángel J. & Ott, Dennis. 2019. Generative grammar and the faculty of language: Insights, questions, and challenges. *Catalan Journal of Linguistics* 229. DOI: https://doi.org/10.5565/rev/catjl.288

Cinque, Guglielmo. 2020. *The syntax of relative clauses: A unified analysis*. Cambridge University Press. DOI: https://doi.org/10.1017/9781108856195

Clifton, Charles & Frazier, Lyn. 1989. Comprehending sentences with long-distance dependencies. In Carlson, Greg N. & Tanenhaus, Michael K. (eds.), *Linguistic structure in language processing* (Studies in Theoretical Psycholinguistics), 273–317. Dordrecht: Springer Netherlands. DOI: https://doi.org/10.1007/978-94-009-2729-2_8

Corrêa, Letícia M. Sicuro. 1995. An alternative assessment of children's comprehension of relative clauses. *Journal of Psycholinguistic Research* 24(3). 183–203. DOI: https://doi.org/10.1007/BF02145355

Crisma, Paola & Guardiano, Cristina & Longobardi, Giuseppe. 2020. Syntactic diversity and language learnability. *Studi e Saggi Linguistici* 58(2). DOI: https://doi.org/10.4454/ssl.v58i2.265

de Villiers, Jill G. & Tager Flusberg, Helen B. & Hakuta, Kenji & Cohen, Michael. 1979. Children's comprehension of relative clauses. *Journal of Psycholinguistic Research* 8(5). 499–518. DOI: https://doi.org/10.1007/BF01067332

del Río, David & López-Higes, Ramón & Martín-Aragoneses, MaríaTeresa. 2012. Canonical word order and interference-based integration costs during sentence comprehension: The case of Spanish subject- and object-relative clauses. *Quarterly Journal of Experimental Psychology* 65(11). 2108–2128. DOI: https://doi.org/10.1080/17470218.2012.674951

Dillon, Brian & Hornstein, Norbert. 2013. On the structural nature of island constraints. In Sprouse, Jon & Hornstein, Norbert (eds.), *Experimental syntax and island effects*, 208–222. Cambridge University Press. DOI: https://doi.org/10.1017/CBO9781139035309.011

Durrleman, Stephanie & Bentea, Anamaria. 2021. Locality in the acquisition of object A'-dependencies: Insights from French. *Glossa: A Journal of General Linguistics* 39(1). DOI: https://doi.org/10.16995/glossa.5876

Evers, Arnold Ernest & van Kampen, Jacqueline. 2008. Parameter setting and input reduction. In Biberauer, Theresa (ed.), *The Limits of Syntactic Variation* (Linguistik Aktuell/Linguistics Today), 483–515. John Benjamins Publishing Company. DOI: https://doi.org/10.1075/la.132.22eve

Ezeizabarrena, María José. 2012. Children do not substitute object relatives with subject relatives in every romance language: The case of Spanish, vol. 57. 161–181. https://www.lingv.ro/RRL%202%202012%20art04Ezeizabarrena.pdf.

Fábregas, Antonio. 2013. Differential Object Marking in Spanish: State of the art. *Borealis – An International Journal of Hispanic Linguistics* 2(2). 1. DOI: https://doi.org/10.7557/1.2.2.2603

Ferreira, Fernanda & Bailey, Karl G. D. & Ferraro, Vittoria. 2002. Good-enough representations in language comprehension. *Current Directions in Psychological Science* 11(1). 11–15. DOI: https://doi.org/10.1111/1467-8721.00158

Ferreira, Fernanda & Lowder, Matthew W. 2016. Chapter Six – Prediction, information structure, and good-enough language processing. In Ross, Brian H. (ed.), *Psychology of learning and motivation*, vol. 65, 217–247. Academic Press. DOI: https://doi.org/10.1016/bs.plm.2016.04.002

Ferreira, Fernanda & Patson, Nikole D. 2007. The 'Good Enough' approach to language comprehension. *Language and Linguistics Compass* 1(1–2). 71–83. DOI: https://doi.org/10.1111/j.1749-818X.2007.00007.x

Ferreiro, Emilia & Othenin-Girard, Christine & Chipman, Harold & Sinclair, Hermine. 1976. How do children handle relative clauses? A study in comparative developmental psycholinguistics. *Archives de Psychologie* 44(172). 229–266.

Ford, Marily. 1983. A method for obtaining measures of local parsing complexity throughout sentences. *Journal of Verbal Learning and Verbal Behavior* 22(2). 203–218. DOI: https://doi.org/10.1016/S0022-5371(83)90156-1

Frauenfelder, U. & Segui, J. & Mehler, J. 1980. Monitoring around the relative clause. *Journal of Verbal Learning and Verbal Behavior* 19(3). 328–337. DOI: https://doi.org/10.1016/S0022-5371(80)90257-1

Friedmann, Naama & Belletti, Adriana & Rizzi, Luigi. 2009. Relativized relatives: Types of intervention in the acquisition of A-bar dependencies. *Lingua* 119(1). 67–88. DOI: https://doi.org/10.1016/j.lingua.2008.09.002

Friedmann, Naama & Rizzi, Luigi & Belletti, Adriana. 2017. No case for Case in locality: Case does not help interpretation when intervention blocks A-bar chains. *Glossa: A Journal of General Linguistics* 2(1). DOI: https://doi.org/10.5334/gjgl.165

Gagliardi, Ann C. 2012. *Input and intake in language acquisition*: University of Maryland, College Park dissertation.

Gavarró, Anna & Leela, Maya & Rizzi, Luigi & Franck, Julie. 2015. Knowledge of the OV parameter setting at 19 months: Evidence from Hindi–Urdu. *Lingua* 154. 27–34. DOI: https://doi.org/10.1016/j.lingua.2014.11.001

Givón, T. 2002. *Bio-linguistics: The Santa Barbara lectures*. John Benjamins. DOI: https://doi.org/10.1075/z.113

Goodluck, Helen & Tavakolian, Susan. 1982. Competence and processing in children's grammar of relative clauses. *Cognition* 11(1). 1–27. DOI: https://doi.org/10.1016/0010-0277(82)90002-6

Gordon, Peter C. & Hendrick, Randall & Johnson, Marcus. 2001. Memory interference during language processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 27(6). 1411–1423. DOI: https://doi.org/10.1037/0278-7393.27.6.1411

Gordon, Peter C. & Hendrick, Randall & Johnson, Marcus. 2004. Effects of noun phrase type on sentence complexity. *Journal of Memory and Language* 51(1). 97–114. DOI: https://doi.org/10.1016/j.jml.2004.02.003

Grinstead, John. 2000. Case, inflection and subject licensing in child Catalan and Spanish. *Journal of Child Language* 27(1). 119–155. DOI: https://doi.org/10.1017/S0305000999004043

Grinstead, John. 2004. Subjects and interface delay in child Spanish and Catalan. *Language* 80(1). 40–72. DOI: https://doi.org/10.1353/lan.2004.0024

Grinstead, John Allen Ray. 1998. *Subjects, sentential negation and imperatives in child Spanish and Catalan*: University of California, Los Angeles dissertation.

Guasti, Maria Teresa. 2017. *Language acquisition: The growth of grammar*. Cambridge, Massachusetts: MIT Press. Second Edition.

Guasti, Maria Teresa & Stavrakaki, Stavroula & Arosio, Fabrizio. 2012. Cross-linguistic differences and similarities in the acquisition of relative clauses: Evidence from Greek and Italian. *Lingua* 122(6). 700–713. DOI: https://doi.org/10.1016/j.lingua.2012.02.001

Gutiérrez-Bravo, Rodrigo. 2005. A case of prosody- induced word order variation without narrow focus: Subject inversion in Spanish relative clauses. In Geerts, Twan & van Ginneken, Ivo & Jacobs, Haike (eds.), *Romance languages and linguistic theory 2003: Selected papers from 'Going Romance' 2003, Nijmegen, 20–22 November* (Current Issues in Linguistic Theory), 115–128. John Benjamins Publishing Company. DOI: https://doi.org/10.1075/cilt.270.07gut

Guțu Romalo, Valeria. 2000. Corectitudine și greșeală: limba română de azi.

Hamann, Cornelia & Abed Ibrahim, Lina. 2017. Methods for identifying specific language impairment in bilingual populations in Germany. *Frontiers in Communication* 2. DOI: https://doi.org/10.3389/fcomm.2017.00016

Hofmeister, Philip & Sag, Ivan A. 2010. Cognitive constraints and island effects. *Language* 86(2). 366–415. DOI: https://doi.org/10.1353/lan.0.0223

Hornstein, Norbert. 2018. The Minimalist Program after 25 years. *Annual Review of Linguistics* 4(1). 49–65. DOI: https://doi.org/10.1146/annurev-linguistics-011817-045452

Jefferies, Elizabeth & Lambon Ralph, Matthew A. & Baddeley, Alan D. 2004. Automatic and controlled processing in sentence recall: The role of long-term and working memory. *Journal of Memory and Language* 51(4). 623–643. DOI: https://doi.org/10.1016/j.jml.2004.07.005

Klem, Marianne & Melby-Lervåg, Monica & Hagtvet, Bente & Lyster, Solveig-Alma Halaas & Gustafsson, Jan-Eric & Hulme, Charles. 2015. Sentence repetition is a measure of children's language skills rather than working memory limitations. *Developmental Science* 18(1). 146–154. DOI: https://doi.org/10.1111/desc.12202

Lasnik, Howard. 2001. When can you save a structure by destroying it? *Proceedings of NELS 31* 2. 301–320.

Lau, Elaine & Tanaka, Nozomi. 2021. The subject advantage in relative clauses: A review. *Glossa: A Journal of General Linguistics* 6(1). DOI: https://doi.org/10.5334/gjgl.1343

Leonetti, Manuel. 2004. Specificity and Differential Object Marking in Spanish. *Catalan Journal of Linguistics* 3(1). 75. DOI: https://doi.org/10.5565/rev/catjl.106

Leonetti, Manuel. 2008. Specificity in clitic doubling and in Differential Object Marking. *Probus* 20(1). 33–66. DOI: https://doi.org/10.1515/PROBUS.2008.002

Lidz, Jeffrey & Gagliardi, Annie. 2015. How nature meets nurture: Universal Grammar and statistical learning. *Annual Review of Linguistics* 1(1). 333–353. DOI: https://doi.org/10.1146/annurev-linguist-030514-125236

Listanti, Andrea & Torregrossa, Jacopo. 2023. The production of preverbal and postverbal subjects by Italian heritage children: Timing of acquisition matters. *First Language* 43(4). 431–460. DOI: https://doi.org/10.1177/01427237231170486

López, Luis. 2012. *Indefinite objects: Scrambling, choice functions, and differential marking*. The MIT Press. DOI: https://doi.org/10.7551/mitpress/9165.001.0001

Lüdecke, Daniel. 2018. Ggeffects: Tidy data frames of marginal effects from regression models. *Journal of Open Source Software* 3(26). 772. DOI: https://doi.org/10.21105/joss.00772

MacDonald, Maryellen C. & Christiansen, Morten H. 2002. Reassessing working memory: Comment on Just and Carpenter (1992) and Waters and Caplan (1996). *Psychological Review* 109(1). 35–54. DOI: https://doi.org/10.1037/0033-295X.109.1.35

Mak, Willem M. & Vonk, Wietske & Schriefers, Herbert. 2002. The influence of animacy on relative clause processing. *Journal of Memory and Language* 47(1). 50–68. DOI: https://doi.org/10.1006/jmla.2001.2837

Mardale, Alexandru & Montrul, Silvina. (eds.) 2020. *The acquisition of Differential Object Marking*, vol. 26 (Trends in Language Acquisition Research). Amsterdam: John Benjamins Publishing Company. DOI: https://doi.org/10.1075/tilar.26

Merchant, Jason. 2001. *The Syntax of silence: Sluicing, islands, and the theory of ellipsis*. Oxford University Press. DOI: https://doi.org/10.1093/oso/9780199243730.001.0001

Merchant, Jason. 2008. Variable island repair under ellipsis. In Johnson, Kyle (ed.), *Topics in ellipsis*, vol. 1174, 132–153. Cambridge University Press. DOI: https://doi.org/10.1017/CBO9780511487033.006

Montrul, Silvina. 2004. *The acquisition of Spanish: Morphosyntactic development in monolingual and bilingual L1 acquisition and adult L2 acquisition* (Language Acquisition & Language Disorders Monographs on the Acquisition of Specific Languages). Amsterdam: Benjamins. DOI: https://doi.org/10.1075/lald.37

Morrill, Glyn & Gavarró, Anna. 2010. Categorial complexity of relativisation and child romance performance. In *New directions in language acquisition: Romance languages in the generative perspective*, 365–387. Newcastle: Cambridge Scholars Publishing.

Perpiñán, Sílvia. 2010. *On L2 grammar and processing: The case of oblique relative clauses and the Null-Prep phenomenon*: University of Illinois at Urbana-Champaign dissertation.

Phillips, Colin. 2013. Some arguments and nonarguments for reductionist accounts of syntactic phenomena. *Language and Cognitive Processes* 28(1–2). 156–187. DOI: https://doi.org/10.1080/01690965.2010.530960

Phillips, Colin & Ehrenhofer, Lara. 2015. The role of language processing in language acquisition. *Linguistic Approaches to Bilingualism* 5(4). 409–453. DOI: https://doi.org/10.1075/lab.5.4.01phi

Poletto, Cecilia & Sanfelici, Emanuela. 2018. On relative complementizers and relative pronouns. *Linguistic Variation* 18(2). 265–298. DOI: https://doi.org/10.1075/lv.16002.pol

Poletto, Cecilia & Sanfelici, Emanuela. 2019. On the relative cycle: The case of P + che relative clauses from Old to Modern Italian. In Bouzouita, Miriam & Breitbarth, Anne & Danckaert, Lieven & Witzenhausen, Elisabeth (eds.), *Cycles in Language Change*. Oxford University Press. DOI: https://doi.org/10.1093/oso/9780198824961.003.0010

Polinsky, Maria & Gallo, Carlos Gómez & Graff, Peter & Kravtchenko, Ekaterina. 2012. Subject preference and ergativity. *Lingua* 122(3). 267–277. DOI: https://doi.org/10.1016/j.lingua.2011.11.004

Presotto, Giacomo. 2024a. The interaction between grammar and processing in intervention locality. *University of Pennsylvania Working Papers in Linguistics*, 127–136. https://repository.upenn.edu/handle/20.500.14332/59851.

Presotto, Giacomo. 2024b. On the syntax and processing of Spanish object relative clauses. *Poster presentation at the 49th Incontro di Grammatica Generativa (IGG49)*.

Presotto, Giacomo. To appear. On the morphosyntax of Spanish (object) relative clauses. *Proceedings of ConSOLE* XXXII. https://www.universiteitleiden.nl/en/events/series/sole.

R Core Team. 2021. *R: A language and environment for statistical computing*. Vienna, Austria.

Rizzi, Luigi. 1990. *Relativized Minimality* (Linguistic Inquiry Monographs). Cambridge, MA, USA: MIT Press.

Rizzi, Luigi. 2004. Locality and left periphery. In Belletti, Adriana (ed.), *Structures and beyond – the cartography of syntactic structures, vol. 3*. Oxford, New York: Oxford University Press. DOI: https://doi.org/10.1093/oso/9780195171976.003.0008

Rizzi, Luigi. 2013. Locality. *Lingua* 130. 169–186. DOI: https://doi.org/10.1016/j.lingua.2012.12.002

Rizzi, Luigi. 2018. Intervention effects in grammar and language acquisition. *Probus* 30(2). 339–367. DOI: https://doi.org/10.1515/probus-2018-0006

Rodríguez-Mondoñedo, Miguel. 2007. *The syntax of objects: Agree and differential object marking*: University of Connecticut dissertation.

Rodríguez-Mondoñedo, Miguel. 2008. The acquisition of Differential Object Marking in Spanish. *Probus* 20(1). DOI: https://doi.org/10.1515/PROBUS.2008.004

Sagarra, Nuria & Sánchez, Liliana & Bel, Aurora. 2019. Processing DOM in relative clauses: Salience and optionality in early and late bilinguals. *Linguistic Approaches to Bilingualism* 9(1). 120–160. DOI: https://doi.org/10.1075/lab.16020.sag

Schriefers, H. & Friederici, A. D. & Kuhn, K. 1995. The processing of locally ambiguous relative clauses in German. *Journal of Memory and Language* 34(4). 499–520. DOI: https://doi.org/10.1006/jmla.1995.1023

Schulz, Petra & Grimm, Angela. 2018. The age factor revisited: Timing in acquisition interacts with age of onset in bilingual acquisition. *Frontiers in Psychology* 9. 2732. DOI: https://doi.org/10.3389/fpsyg.2018.02732

Sevcenco, Anca & Avram, Larisa. 2012. Romanian-speaking children's comprehension of relatives. *Revue Roumaine de Linguistique* LVII(2). 219–239.

Shlonsky, Ur. 1997. *Clause structure and word order in Hebrew and Arabic: An essay in comparative Semitic syntax* (Oxford Studies in Comparative Syntax). Oxford, New York: Oxford University Press. DOI: https://doi.org/10.1093/oso/9780195108668.001.0001

Spada, Nina & Shiu, Julie Li-Ju & Tomita, Yasuyo. 2015. Validating an Elicited Imitation Task as a measure of implicit knowledge: Comparisons with other validation studies. *Language Learning* 65(3). 723–751. DOI: https://doi.org/10.1111/lang.12129

Sprouse, Jon & Wagers, Matt & Phillips, Colin. 2012. A test of the relation between working-memory capacity and syntactic island effects. *Language* 88(1). 82–123. DOI: https://doi.org/10.1353/lan.2012.0004

Sprouse, Jon & Wagers, Matthew W. & Phillips, Colin. 2013. Deriving competing predictions from grammatical approaches and reductionist approaches to island effects. In Sprouse, Jon & Hornstein, Norbert (eds.), *Experimental Syntax and Island Effects*, 21–41. Cambridge University Press 1st edn. DOI: https://doi.org/10.1017/CBO9781139035309.003

Starke, Michal. 2001. *Move dissolves into Merge: A theory of locality*: University of Geneva dissertation.

Sturt, Patrick & Sanford, Anthony J. & Stewart, Andrew & Dawydiak, Eugene. 2004. Linguistic focus and good-enough representations: An application of the change-detection paradigm. *Psychonomic Bulletin & Review* 11(5). 882–888. DOI: https://doi.org/10.3758/BF03196716

Svenonius, Peter. 2016. Spans and words. In Siddiqi, Daniel & Harley, Heidi (eds.), *Morphological Metatheory* (Linguistik Aktuell/Linguistics Today), 201–222. John Benjamins Publishing Company. DOI: https://doi.org/10.1075/la.229.07sve

Svenonius, Peter. 2020. A span is a thing: A span-based theory of words. In Asatryan, Mariam & Song, Yixiao & Whitmal, Ayana (eds.), *NELS 50: Proceedings of the fiftieth annual meeting of the North East Lingusitic Society*, 193–206. GLSA.

Tavakolian, Susan L. 1981. The conjoined-clause analysis of relative clauses. In Tavakolian, Susan L. (ed.), *Language acquisition and linguistic theory*, 167–187. Cambridge, MA: MIT Press.

Torrego, Esther. 1998. *The dependencies of objects* (Linguistic Inquiry Monographs 34). Cambridge, Mass: MIT Press. DOI: https://doi.org/10.7551/mitpress/2337.001.0001

Torrego, Esther. 2002. Aspect in the prepositional system of Romance. In Satterfield, Teresa & Tortora, Christina & Cresti, Diana (eds.), *Current issues in Romance languages: selected papers from the 29th linguistic symposium on Romance languages (LSRL), Ann Arbor, 8–11 April 1999* (Current Issues in Linguistic Theory), 337–357. John Benjamins Publishing Company. DOI: https://doi.org/10.1075/cilt.220.23tor

Torregrossa, Jacopo & Eisenbeiß, Sonja & Bongartz, Christiane. 2022. Boosting bilingual metalinguistic awareness under dual language activation: Some implications for bilingual education. *Language Learning* 73(683–722). DOI: https://doi.org/10.1111/lang.12552

Torrens, Vincent. 2017. Verb agreement in the interpretation of relative clauses in early spanish. *Talk presented at GALA 13, Palma de Mallorca*.

Traxler, Matthew J. & Pickering, Martin J. 1996. Plausibility and the processing of unbounded dependencies: An eye-tracking study. *Journal of Memory and Language* 35(3). 454–475. DOI: https://doi.org/10.1006/jmla.1996.0025

Tsimpli, Ianthi Maria. 2014. Early, late or very late?: Timing acquisition and bilingualism. *Linguistic Approaches to Bilingualism* 4(3). 283–313. DOI: https://doi.org/10.1075/lab.4.3.01tsi

Warren, Tessa & Gibson, Edward. 2002. The influence of referential processing on sentence complexity. *Cognition* 85(1). 79–112. DOI: https://doi.org/10.1016/S0010-0277(02)00087-2

Warren, Tessa & Gibson, Edward. 2005. Effects of NP type in reading cleft sentences in English. *Language and Cognitive Processes* 20(6). 751–767. DOI: https://doi.org/10.1080/01690960500051055

Wu, Fuyun & Kaiser, Elsi & Vasishth, Shravan. 2018. Effects of early cues on the processing of Chinese relative clauses: Evidence for experience-based theories. *Cognitive Science* 42(S4). 1101–1133. DOI: https://doi.org/10.1111/cogs.12551

Zehr, Jeremy & Schwarz, Florian. 2018. PennController for Internet Based Experiments (IBEX).