The acquisition of object relative clauses in Spanish

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The aim of this paper is to compare children's performance in a declarative object and subject relative comprehension task. Relativized Minimality proposes that object relative clauses are more difficult to process than subject relative clauses because they feature the intervention of the subject between the head and its trace. A comprehension test to 80 Spanish monolingual children aged from 4;6 to 7;10 was applied. Sentences with subject/object relative clauses when NPs had the same or different morphosyntactic features were tested. A significant statistical difference was found for the performance between object relatives and subject relatives, since the number of correct answers is higher in subject relatives ($p < 0.001$). In addition, a significant statistical difference was found in object relatives between clauses that had the same or different morphosyntactic features, since the former were more difficult to understand ($p < 0.001$). The fact that Object Relatives differed in number morphology facilitated the interpretation of the sentence.

KEYWORDS

acquisition, L1, object relatives, typical, Spanish

1 Introduction

It has been found that children have difficulties in understanding object relative clauses up to five years of age (English: Sheldon, 1974; Goodluck and Tavakolian, 1982; Perez-Leroux, 1993, 1995, Diessel and Tomasello, 2000; French: Labelle, 1990, 1996; Guasti and Shlonsky, 1995; Spanish: Ezeizabarrena, 2012; Italian: Guasti and Cardinaletti, 2003; Adani, 2011; Contemori and Belletti, 2014; Hebrew: Arnon, 2005, 2010; Friedmann et al., 2009; Portuguese: Costa et al., 2011; Catalan: Gavarró et al., 2012; German: Adani et al., 2013). In particular, it has been found that children's ability to understand relative clauses depends heavily on the test used, in addition to an important contrast across languages: in languages with head initial relative clauses, subject relative clauses are easier to understand than object relative clauses (Adani, 2011). Contrary to this finding, in languages with head final relative clauses we might find a different pattern, although authors usually find mixed results (Chinese: Chang, 1984; Lee, 1992; Hsu et al., 2009; Chen and Shirai, 2014; Hu, 2014).

In the particular case of the study of the acquisition of object relatives (ORs) in Spanish, some longitudinal corpora have found the production of both subject relatives (SRs) and ORs by age 2;6; however, general rates of subject relatives are higher than those of object relatives (Hernández-Pina, 1984; Barreña, 2000). In an elicited production study, Ferreiro et al. (1976) found that children avoided object relativization, and preferred to produce relatives with passives, "resumptive" NPs, or clitic pronouns in a relative clause internal position. Perez-Leroux (1993) and Ezeizabarrena (2012) have found a preference for subject relatives versus object relatives in production; however, to our knowledge, no language comprehension studies have been carried out on the acquisition of object relatives in typical L1 monolingual

Spanish-speaking children. Children usually avoid the production of headed ORs (Contemori and Belletti, 2014), tending instead to produce alternative constructions, which might be easier for them to acquire, like causative passives and resumptive pronouns (Contemori and Belletti, 2014). However, Ezeizabarrena (2012) did not identify any morphosyntactic pattern as an alternative to the production of object relatives, like the use of passives or resumptive pronouns, so she concludes that it is difficult to propose the existence of a OR-by-SR substitution strategy in Spanish for 5;0- and 7;0-year-old children; maybe this is because resumptive pronouns in Spanish require a long structural distance between the nominal head and the gap (De Mello, 1992) or between the relative pronoun *que* and the gap (Brucart, 1999).

In addition to all these findings, some authors have related the acquisition of relative clauses with the development of passives (Guasti et al., 2012; Contemori and Belletti, 2014; Contemori and Marinis, 2014), resumptive pronouns (Contemori and Belletti, 2014), wh-questions (Stromswold, 1995; Friedmann et al., 2009; Guasti et al., 2012) and free relatives (Friedmann et al., 2009). Also, some authors have studied ORs with clinical populations, such as those with Developmental Language Disorder (DLD) (Friedmann and Novogrodsky, 2004; Adani et al., 2014) and agrammaticality (Grillo, 2009). Some comparisons on the data about children with DLD and data from the field of Second Language Acquisition (L2) will be developed later on in this paper.

Many factors can affect the preference for subject relatives over object relatives: this difficulty depends on (a) the structural similarity between the moved element and the intervening subject (Friedmann et al., 2009); (b) animacy: relative clauses are significantly easier to interpret when the object of the relative clause is inanimate or when the verb of the subordinate clause is intransitive (Goodluck and Tavakolian, 1982; Guasti et al., 2012); (c) methodology: the methodology used is crucial for the performance in comprehending and producing object relatives (Friedmann et al., 2009; Adani, 2011), since children can produce and comprehend relative clauses at age four when a suitable task is performed (Hamburger and Crain, 1982); (d) type of NPs: object relative clauses are easier when the head is lexically specified and the embedded constituent is a 1st or 2nd person pronoun or a proper name (Arnon, 2010); (e) gender: Belletti et al. (2012) found that when NPs have a gender mismatch, it sharply improved the comprehension of object relatives in Hebrew, but not in Italian; these authors compared object relative clauses where the moved object and the intervening embedded subject have the same or different gender. They argue that gender is part of the featural composition of the clausal inflectional head in Hebrew, whereas tensed verbs are not inflected for gender in Italian. In adults, it has also been found that object relative clauses are more difficult to understand than subject relative clauses in previous studies (Frauenfelder et al., 1980). This asymmetry has been explained by the Noun Phrase Accessibility (Keenan and Comrie, 1977), the Active Filler Hypothesis (Frazier and Fodor, 1978), the Dependency Locality Theory (Gibson, 1998) or by Intervention (Grillo, 2008; Friedmann et al., 2009).

2 Theoretical background

2.1 Previous studies

This section describes studies on the acquisition of subject and object relatives in several languages and the main theories that account

for the data found so far. Perez-Leroux (1993) developed two studies of elicited production, in a task where children had to produce different kinds of relative clauses (SS, SO, OS, SS). In the first study, she found that children produced many truncated relatives after the main clause with no syntactic connection and a few embedded relatives. In another elicited production study, in which children had to produce direct object extractions, oblique phrase extractions, possessive phrase extractions and locative phrase extractions, children preferred to produce subject relatives (see Montrul, 2004, for a review).

Furthermore Ezeizabarrena's (2012) study with 15 children consisted of a selection task to elicit relative clauses. She tested the children longitudinally when they were 5;0 and 7;0 years old; she found that 5 year-old children produce correct subject relatives in Spanish almost at the same rates as adults, whereas the rates of correct object relatives are close to chance at age 5;0. Children who are 7;0 years old produce less correct object relatives than adults. Ezeizabarrena found that all 5;0 and 7;0 years old children produced one or more target deviant relative clauses, which suggests that errors are generalized even at age 7;0. Headless relative clauses are very frequent (38%) in 5;0-year-old children, whereas in 7-year-old children they only represent 4%, and in adults, only 2.6% of relative clauses. With respect to the production of clitics, she found that half of the relative clauses in all the samples contain a clitic, though rates of clitics decrease with age. Clitics are mostly attested in 5;0-year-old children, whereas lexical objects are the most frequent option for 7;0-year-old children and adults. Only 5-year-old children produce clitics in subject relatives, whereas clitics also appear in the speech of 7-year-old children and adults. Deviant sentences usually consist of a role reversal, a person reference error, an incorrect use of the preposition or incorrect inflection on the verb.

Studying production of object/subject relatives in Italian, Guasti et al. (2012) found that object relatives are more difficult to acquire than subject relatives. Children improve their production of correct object relative clauses as they get older but the asymmetry persists in 9-year-old children. They focused on how animacy explains the difficulty to produce object relatives, and found that sentences with inanimate objects and animate subjects were easier to produce than sentences where both were animate. Sentences where both objects and subjects were animate were disambiguated by number feature, so that only one agreed with the verb. They found that production of sentences disambiguated by number feature was more difficult in object relatives than in subject relatives. They also found that the production of correct sentences disambiguated by number feature were more frequent in 9;0-year-old children than in 5;0-year-old children. Common errors that children committed were reduced in head relative clauses, declarative responses or reverse head responses in 5-year-old children, whereas 9-year-old-children produced more passives and reverse head responses.

Studying production of object relatives in Italian, Utzeri (2007) used a Preference Task and a Picture Description Task, based on elicitation procedures by Novogrodsky and Friedmann (2006). Findings show that it was difficult for children to produce object relatives, and that they used other strategies such as changing the verb of the relative clause, or using a passive sentence. Guasti and Cardinaletti (2003) also found the use of passive and the *si*-causative as a strategy to avoid object relatives. Belletti and Contemori (2010) focused on the fact that many relative clauses are ambiguous since these can be interpreted as a subject relative with the postverbal noun

phrase being the direct object of the verb of the relative clause, or can be interpreted as an object relative with the postverbal noun phrase being the postverbal subject of the relative clause. They took into account unambiguous sentences (i.e., where object and subject were disambiguated by number feature). They also found that object relatives were produced less than subject relatives for all age groups.

Arosio et al. (2009) studied the effect of number agreement and word order for disambiguating subject and object relatives in the acquisition of Italian, and they compared the processing cost of these two ways of disambiguating relative clauses. In Italian, when the head of the Relative Clause and the embedded NP do not have the same number features, the sentence is not ambiguous, because only the subject agrees in number with the embedded verb. Also, in Italian object relatives are disambiguated by placing the embedded subject in the preverbal position. Their findings suggest that subject relative clauses are easier to comprehend than object relative clauses for all groups of children. They found no development in the comprehension of subject relative clauses, since these were very easy to understand from an early stage. They found that object relative clauses disambiguated by position are easier to comprehend than object relative clauses disambiguated by number agreement.

In another study, Belletti et al. (2012) took into account the nature of the subject in Italian. They noticed that in previous studies, the subject was always a lexical noun phrase. In this new study, the subject was always a pronoun, either overt or null. With this new design, these authors found that children had no difficulties producing the elicited object relative clause. Therefore, the production of object relatives is significantly improved when a pronominal is used as subject in the relative clause.

With respect to comprehension, Adani (2011) contrasted subject and object relatives in Italian; this time, controlling for ambiguity, since a postverbal noun phrase can be interpreted as a direct object or as a postverbal subject, which could be the cause of difficulty for object relatives. This ambiguity disappears when the relative head and the noun phrase internal to the relative clause have a different number marker and, therefore mismatch in number. In this case, Adani (2011) found that subject relatives are the best understood at all ages, object relatives are understood at chance, and that object relatives with the subject of the relative clause in postverbal position are poorly understood by children of all ages.

Arosio et al. (2009) tested the comprehension of unambiguous ORs in (a) a number match condition between the relative and the subject of the relative clause in pre-verbal position, and in (b) a number mismatch condition with the subject in postverbal position. In this contrast, the authors also found that subject relatives were easier to understand than object relatives for children. In addition, Adani et al. (2010) studied the comprehension of object relative clauses with Italian children. For this study, they controlled Number and Gender feature values on subject and object relative clauses. They found that accuracy in number conditions was higher than in gender conditions. They propose that external and syntactically active features (such as Number) reduce intervention whereas internal and lexicalized features (such as Gender) reduce intervention to a lesser extent.

In Catalan, Gavarró et al. (2012) performed an elicitation task, based on Novogrodsky and Friedmann (2006). They used transitive verbs in the embedded sentences, some of them reversible, and some irreversible. They observed that children produce subject relatives like adults, but they produced fewer object relatives. They detected that children produced

object relatives with a full DP copy of the relativized constituent. Children also produced resumptive pronouns, but only with object relatives. These authors claim that processing resources might be limited in children. Similarly in a study on the production of subject relatives in French, Labelle (1990, 1996) reports the production of resumptive pronouns as a strategy to facilitate the acquisition of subject relatives. In addition, studying the production of subject/object relatives in European Portuguese, Costa et al. (2011) found that children produced object relatives less often than subject relatives. They propose that the difficulty of children to produce object relatives is due to the interpretation of the displaced argument across the intervening subject in this type of clauses.

Finally, studying the acquisition of Hebrew, Friedmann et al. (2009) concluded that headed object relatives with a resumptive pronoun are difficult to understand for children. They did not find any significant difference between object relatives with and without a resumptive pronoun. Performance on the free object relatives was significantly better than on the headed object relatives whereas comprehension of free subject relatives was only marginally significantly better than headed subject relatives. Children performed above chance on free subject relatives and free object relatives, and this performance was better than on headed object relatives. They explain the easier performance of free object relatives pointing out that the relative operator in free relatives does not contain any lexical NP restriction, and therefore should disqualify the subject as an intervener. They also studied the comprehension of object relatives with an arbitrary impersonal subject, where the possible intervener does not have any lexical NP restriction. Thus, the intervener and the crossing element are again of different types. The object relatives with the arbitrary subject were comprehended significantly better than the headed object relatives.

2.2 Theoretical proposals

Several theoretical proposals have tried to explain the asymmetry between Subject Relatives (SRs) and Object Relatives (ORs), most of them based on adult language processing. The Dependency Locality Theory (DLT) attributes the difficulty in the acquisition of relative clauses by children to the storage cost of grammatical dependencies (Gibson, 1998, Gibson, 2000). Storage resources are required to keep track of syntactic dependencies. DLT predicts that ORs are more difficult than SRs in head initial languages due to a larger number of unresolved dependencies in the processing of object relative clauses in a given part of the sentence, but ORs are easier than SRs in head final languages. The Linear distance Hypothesis (LDH) proposes that processing difficulty increases in proportion to linear distance between gaps and fillers: object – subject (OS) will be more difficult than subject – subject (SS) in head initial languages, but easier than SS in head final languages (Tarallo and Myhill, 1983). The Structural Depth Hypothesis (SDH) proposes that processing difficulty is determined by the number of syntactic nodes intervening between the gaps and fillers: object relatives will be more difficult than subject relatives in head initial and head final languages (O'Grady, 1996, 1999). The Active Filler Hypothesis proposes that the parser tries to close an A' dependency as soon as possible: when an A' binder is processed, the parser tries to postulate the variable in the closest argument position, i.e., the subject position (Frazier et al., 1983, Crain and Fodor 1985,

Frazier and Clifton 1989). This strategy explains the fact that subject relatives are easier to understand than object relatives, because ORs require a reanalysis. The Mismatch Detection Point Hypothesis (MDPH) proposes that the garden path strength in the processing of relative clauses depends on the different points of the analysis of Relative Clauses at which the temporary ungrammaticality triggers reanalysis (Arosio et al., 2009). The Noun Phrase Accessibility (Keenan and Comrie, 1977) proposes that languages differ with respect to the relativization of NP positions; Keenan and Comrie say that there is a hierarchy for the relative accessibility to relativization of NP, where subject relatives are higher in the accessibility than object relatives. Finally, Relativized Minimality (RM) proposes that object relative clauses and object which-questions are more difficult to understand than subject relative clauses because they feature the intervention of the subject between the head and its trace (Rizzi, 1990, 2004). RM follows the principle of constraining syntactic computations (Chomsky, 2001). All these theories make the same prediction in head initial languages, although for head final languages their predictions are differentiated by the difficulty of object relative clauses with respect to subject relative clauses. In this paper, RM will be the theory applied and developed. RM predicts that number mismatch will be relevant only in ORs, but not in SRs whereas the rest of the theories would predict a facilitation of number mismatch for both ORs and SRs.

RM (Rizzi, 1990) is a locality constraint on dependencies within sentences, where a local structural relation cannot hold between X and Y when Z intervenes as a potential candidate for the same local relation:

(1)	a.	X … Z … Y (Rizzi, 2004: 225)
	b.	Z intervenes between X and Y iff Z c-commands Y and Z does not c-command X.

The configurations for the Relativized Minimality are given in (2), where A and B stand for abstract morphosyntactic features triggering movement.

(2)		X	Z	Y	
	a.	+A ……	+A ……	<+A>	(identity)
	b.	+A, +B……	+A ……	<+A, +B>	(inclusion)
	c.	+A ……	+B ……	<+A>	(disjunction)
		Friedmann et al. (2009)			

Friedmann et al. (2009) suggest that this constraint applies to adults, but children apply a strict version of RM, which requires a distinct featural specification of the target with respect to the intervener and a disjoint specification, since inclusion is too difficult for children to interpret. These authors suggest that young children might have difficulties understanding object relative clauses because at early ages, they have less processing resources. Disjunction is easier to process than inclusion, since it requires being held in working memory (Friedmann et al., 2009; Guasti et al., 2012); in contrast, adults do not commit errors with an inclusion relation although it does slow down parsing.

3 Method

3.1 Participants

The purpose of this paper is to present the results of an experiment in which monolingual Spanish-speaking children between 4 and 7 years of age are tested on their ability to understand object and subject relatives. 80 Spanish monolingual children aged from 4;3 to 7;9 completed a comprehension test. The children were collapsed into four age groups with the following age ranges: age group 4 (4,3-4,11), age group 5 (5,1-5,10), age group 6 (6,2-6,11) and age group 7 (7,2-7,9). Children were recruited from public schools near Madrid, and all of them were typically developing children. All participants were monolingual Spanish speaking children, and Spanish was the only language spoken at home. All children lived in the area of Madrid. Researchers explained the main purpose of this research to all parents of the children participating in this study, and they were requested to sign a form approving their child's participation in this research. Since studies in the acquisition of relative clauses in Spanish have been limited to production studies, this study furthers the state of the field by providing data of the comprehension of object relative clauses in Spanish. This research was approved by the ethical Commission of the University with the reference COEDU_FECORA.

3.2 Procedure

This study compared six different relative clauses differing in two dimensions: (a) the case of the head of the relative clause, and (b) number agreement. In half of the sentences, the head of the relative clause in the embedded clause is an object (3a, 3c), and in the other half, the head of the relative clause in the embedded clause is a subject (3b, 3d). The number of the subject and the object of the relative clause can be the same (3a, 3b) or it can be different (3c, 3d). Also tested were sentences where the head of the relative clause in the embedded clause is an object, and the subject of the relative clause is in postverbal position, with the same number (3e) or with number mismatch (3f). The last two sentences are ambiguous in Italian in the same number condition, but not in in Spanish because of Direct Object Marking (DOM) (i.e., "a"). OR refers to the cases where head of the relative clause in the embedded clause is an object, SR refers to the cases where head of the relative clause in the embedded clause is a subject, SM refers to the cases where the number of the subject and the object of the relative clause are the same, DM refers to the cases where the number of the subject and the object of the relative clause are different.

3.	a)	el gato que la rana está mojando (object relative, same morphology).
		the cat that the frog is watering.
	b)	el gato que está mojando a la rana (subject relative, same morphology).
		the cat that is watering the frog.
	c)	el gato que las ranas están mojando (object relative, different morphology).
		the cat that the frogs are watering.

	d)	el gato que está mojando a las ranas (subject relative, different morphology).
		the cat that is watering the frogs.
	e)	el gato que está mojando la rana (object relative, same morphology) postverbal.
		the cat that the frog is watering.
	f)	el gato que están mojando las ranas (object relative, different morphology) postverbal.
		the cat that the frogs are watering.

The test is a set of 18 picture/sentence pairs (see Appendix A). The pictures were taken from a test by De Vincenzi (1996) originally designed to test subject/object wh-questions in Italian (see Appendix A). The sentences were translated into Spanish. All Noun Phrases were animate and all verbs were transitive. This test was administered to children in individual sessions in a separate room in their school. In half of the sentences both object and subject had the same morphosyntactic features (both were singular), and in half of the sentences object and subject had different morphosyntactic features (one of them was in plural and the other was in singular). All children were exposed to the same 18 items, and the sentences were presented in a randomized order. A sample of the pictures in this test is shown below:

Children are requested to point to the animal that the sentence refers to. The same picture is used for all the conditions. In the case of the sentence "Point to *the cat that the frogs are watering*"," the correct answer is to point to the cat on the left in Figure 1.

This is a mixed designed study between subjects and within subject variables. The independent variables were the age of children, the head of the relative clause in the embedded clause (OR *vs* SR), the number of the subject and the object of the relative clause (SM *vs* DM) and the dependent variable was the number of correct answers by children. The statistical analysis of Chi Square was used to compare the performance of children depending on the type of sentence (subject relatives vs. object relatives), type of Morphological Features (Same Morphology vs. Different Morphology), and to compare Age (4 year-olds vs. 5 year-olds vs. 6 year-olds vs. 7 year-olds).

4 Results

Table 1 shows the frequencies of correct interpretations of sentences with subject relative clauses and object relative clauses when both object and subject had different and the same morphosyntactic features. I collapsed the data in order to show more clearly the effect of type of sentence independently.

Relativized Minimality (RM) predicts that children will have more difficulties understanding ORs, compared to SRs. The observed frequencies of correct answers in subject relatives are higher than in object subject relatives for all ages, confirming this first prediction of RM. A significant difference was shown between these structures for all ages ($\chi^2 = 133.779$; $p < 0.001$), and performance improves with age ($\chi^2 = 20.015$; $p < 0.001$). Table 2 shows the frequencies of correct and incorrect interpretations of sentences with the same and different morphosyntactic features, with subject relative clauses and object relative clauses collapsed. I collapsed the data in order to show more clearly the effect of morphology independently.

A significant difference was found between sentences with the same and different morphosyntactic features for all ages ($\chi^2 = 424.67$; $p < 0.001$), and performance improves with age ($\chi^2 = 21.446$; $p < 0.001$). Relativized Minimality (RM) predicts that children will have more difficulties understanding object relatives when morphological features are the same with respect to number, but this contrast should not be found in SRs, since there is no interference in this case. As you can see in Table 3, the frequencies observed for all ages of correct answers in ORs are higher when morphological features are different than when morphological features are the same, confirming this second prediction of RM; however, there is no significant difference
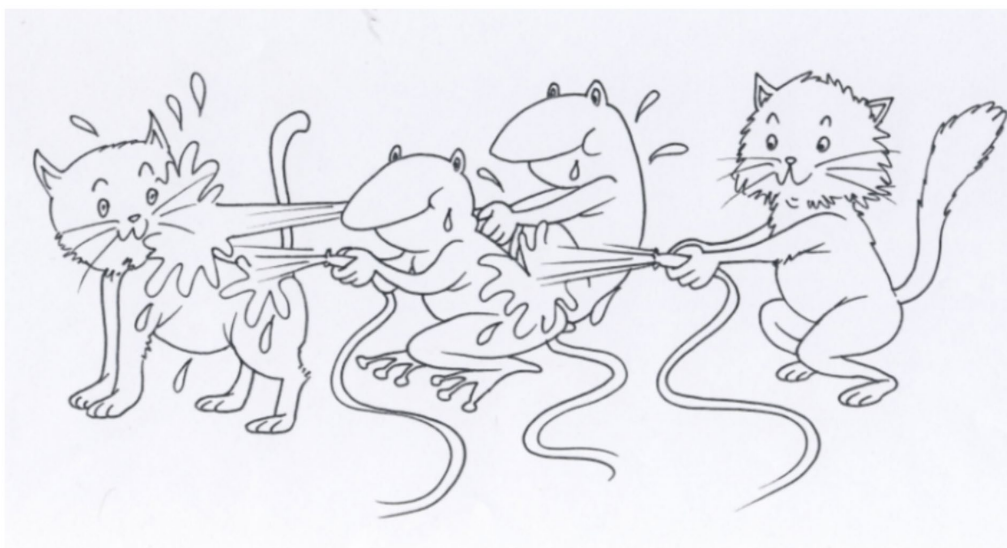

FIGURE 1
Example of pictures used, based in De Vincenzi (1996).

TABLE 1 Frequencies of correct interpretations of subject and object relative clauses.

Age	Subject relatives	Object relatives
4;0	143	106
5;0	149	120
6;0	154	127
7;0	160	146

TABLE 2 Frequencies of correct interpretations of sentences with the same and different morphosyntactic features.

Age	Different morphology	Same morphology
4;0	130	119
5;0	137	132
6;0	145	136
7;0	155	151

TABLE 3 Frequencies of correct interpretations of sentences with subject relative clauses and object relative clauses with the same and different morphosyntactic features.

Age	SRDM	ORDM	SRSM	ORSM	ORDMPS	ORSMPS
4;0	73	57	70	49	14	12
5;0	75	62	74	58	15	13
6;0	78	67	76	60	15	14
7;0	80	75	80	71	18	16

in SRs. A significant difference was found between sentences with the same and different morphological features for all ages ($\chi^2 = 424.67$; $p < 0.001$), and performance improved with age ($\chi^2 = 21.446$; $p < 0.001$). Table 3 shows the frequencies of correct interpretation of sentences with the same and different morphosyntactic features, with subject relative clauses and object relative clauses shown separately:

Relativized Minimality (RM) predicts that children will have more difficulties understanding object relatives than subject relatives, and in understanding clauses with the same morphological features than those with different morphological features. Analysis of accuracy scores in the comprehension of all types of relatives across age groups revealed that the highest number of correct answers observed is for subject relatives with different morphological features (SRDM) and the worst performance were obtained for object relatives with postverbal subject with different morphological features (ORDMPS) and with the same morphological features (ORSMPS), confirming this third prediction of RM. A significant difference between object relatives and subject relatives with different morphosyntactic features ($\chi^2 = 64.766$; $p < 0.001$), and between object relatives and subject relatives with the same morphosyntactic features ($\chi^2 = 68.568$; $p < 0.001$) was found.

In addition, there is a significative difference between object relatives with the same morphosyntactic features and subject relatives with different morphosyntactic features ($\chi^2 = 42.493$; $p < 0.001$), and between object relatives with different morphosyntactic features and subject relatives with the same morphosyntactic features ($\chi^2 = 104.507$; $p < 0.001$) when all ages are collapsed. With respect to postverbal subjects, a significant difference was found between object relatives with the same and with different morphosyntactic features, the latter being the easiest ($\chi^2 = 51.097$; $p < 0.001$). However, no statistically

significant difference was found between the performance on the comprehension of object relatives on preverbal subjects and postverbal subjects, both with different morphological features (ORDMPS) and with the same morphological features (ORSMPS).

After analyzing the results, we can conclude that object relatives are more difficult to understand than subject relatives for all ages in Spanish. However, performance improves with age, as a statistically significant difference was shown for different age groups. The difficulty in understanding object relatives depends on whether the subject and the object of the relative clause have the same or different morphology with respect to the number feature. I propose that the difficulty in acquiring object relative clauses is explained by Relativized Minimality: children may have difficulties with dependency when the two terms of the relation are separated by an intervener, as in object relative clauses (Friedmann et al., 2009).

5 Discussion

This study focuses on comprehension of object relatives by monolingually-raised Spanish-speaking children. Their performance in object and subject relatives with a comprehension task was compared. Postverbal subjects were also taken into consideration, which might be important when we compare the data with the acquisition of object relatives in Italian, because in Spanish there is a preposition which is a Direct Object Marker (DOM); and this is relevant for the interpretation of data. As we have seen in previous studies, an adapted task for children shows that children can interpret subject and object relatives, although object relatives are more difficult for children to understand; the main error that children commit is to

interpret object relatives as subject relatives. This error can be explained by the locality effects of the intervention of an embedded constituent. With respect to object relatives, children committed less errors in a mismatch condition than in conditions where both constituents had the same number value. These findings are consistent with the literature on the acquisition of object relatives in Spanish production. We found similar data in Perez-Leroux (1993), as I mentioned earlier, since children preferred to produce subject relatives; and in Ezeizabarrena (2012), who found that correct object relatives are close to chance level at age 5;0. Similar results have been found in other languages like Italian (Arosio et al., 2009; Friedmann et al., 2009; Guasti et al., 2012), Catalan (Gavarró et al., 2012), French (Labelle, 1990, 1996) or European Portuguese (Costa et al., 2011). With respect to postverbal subjects, a significant difference was found between object relatives with the same and with different morphosyntactic features. In addition, no statistically significant difference was found between the performance on the comprehension of object relatives with preverbal and postverbal subjects; however, the number of correct answers in postverbal subjects found in Spanish is higher than in Italian, which could be due to the Direct Object Marking found in Spanish, since Italian children have no cues to differentiate direct objects from subjects in postverbal position.

If errors are due to locality effects of the intervention of an embedded constituent, then we should find similar errors in similar structures, like interrogative sentences, since these also have locality restrictions. Wh-questions are universal to all languages (e.g., Comrie, 1981). The wh-word can move overtly to a sentence-initial position or can remain *in situ* like in a declarative sentence. Object and subject questions have a different structure, and it shows in the grammatical acceptance for the that-trace effect, parasitic gaps, wh-islands, relative clauses, and do-support (Chomsky 1986a,b). Because of the different structure of subject and object questions, subject relative questions are supposed to be easier to learn than object relative questions (Gazdar, 1981). In this vein, it has been attested that wh-questions are mastered relatively early cross-linguistically, although crosslinguistically, children can produce subject questions more easily than object questions (Clahsen et al., 1995, for German; Guasti, 1996, Guasti et al., 2012, for Italian; Håkansson and Hansson, 2000; Santelmann, 1998, for Swedish Wilhelm and Hanna, 1992; Van der Lely and Battell, 2003 for English). In addition, this asymmetry has also been attested in comprehension (Avrutin, 2000 for English; Friedmann et al., 2009 for Hebrew; Philip et al., 2001 for Dutch; De Vincenzi et al., 1999 for Italian).

Italian children attain adult-like performance much later than English and Hebrew speaking children (de Villiers et al. 1979). De Vincenzi et al. (1999) found that in the acquisition of Italian-speaking children, comprehension of subject questions was unproblematic from the age of 4; however, comprehension of object questions was rather inaccurate in the early stages. Guasti et al. (2012) say that the subject/object asymmetry depends on the surface form that wh-questions have in each language. They propose that this difficulty in Italian questions is because disambiguation comes from verb agreement, as the subject may stay in a postverbal position. These authors report that when children made errors, they produced a subject question for an object question, a wh-element alone, an argument drop, a passivization, a topicalization, or they changed a wh-question into a yes/no question. These authors compared a group of Italian children and a group of adults. They report that the rate of correct subject questions was higher than that of correct object questions in children

but only for who-questions; they also found that adults were more accurate than children in producing who-questions, although no difference was found for subject which-questions; another interesting finding is that in subject-questions children performed who-questions better than which-questions; in object-questions this difference is not found because children are equally bad at who and which-questions. These authors propose the object/subject asymmetry in wh-questions is based on the interference of the object copy in the AGREE relation between AgrS and the subject in the Spec of the verb phrase.

In addition, if errors are due to locality effects of the intervention of an embedded constituent, then we should find similar errors in similar processes like Second Language Acquisition or in Developmental Language Disorders (DLD). In the acquisition of object relatives as a Second Language, the results depend on the proficiency in the L2: when participants have a high proficiency, results are similar to what is found in adult processing and child L1 acquisition. Also, in L2 the results depend on the properties of L1: when L1 and L2 are both head initial, results are similar to adult language processing; however, if L1, L2 or both are head final languages, mixed results are usually found. Izumi (2003) studied English L2 learners, with many different languages as L1. In addition, participants had different levels of proficiency; because of the heterogeneity of the participants involved, Izumi did not find significant differences for the difficulty between subject and object relative clauses. Aydin (2007) studied the learning of Turkish as a second language (Turkish is a head final language with respect to relative clauses) by L1 English, Japanese, and Korean participants (English is a head initial language, whereas Japanese and Korean are head final languages with respect to relative clauses). Aydin found that subject relative clauses were easier to understand than object relative clauses by intermediate learners, but found no differences when participants were basic learners. In this vein, Chen (2006) studied the learning of English as a second language by Chinese native speakers and found that object relative clauses were more complex when participants were advanced learners of English, but did not find any differences when participants had lower proficiency levels. Özçelik (2006) studied English (head initial language), Japanese (head final language) and Korean (head final language) native speakers, who were learning Turkish as a second language; Özçelik found that subject relative clauses were more difficult to understand for English, Japanese and Korean L1 speakers with an intermediate level of Turkish as a second language. As we can see, the contrast between subject and object relatives has mixed results when we observe the data found in Second Language Acquisition.

As studies above show, in the acquisition of object relatives as a Second Language (L2), the results depend on the proficiency in the L2: when participants have a high proficiency, results are similar to what is found in adult processing and child L1 acquisition. Also, in L2 the results depend on the properties of L1: when L1 and L2 are both head initial, results are similar to adult language processing; however, if L1, L2 or both are head final languages, mixed results are usually found.

Since it has been argued that first language acquisition and language disorders can follow a similar path with a slower pace, in this paper, studies on the acquisition of object relatives in children with Developmental Language Disorder (DLD) in head initial languages also deserve a mention, in order to see whether this development parallels the development found in typically developing children. Friedmann and Novogrodsky (2004) studied the comprehension and

production of Hebrew-speaking DLD children, and they compared the data with typically developing children. They found that children with DLD have difficulties to process object relative clauses, but children with DLD did not have any particular difficulty with subject relatives, compared to typically developing children. These authors proposed that children with DLD have difficulties to assign the thematic role to a moved constituent. Studying children with DLD who speak English, Schuele and Nicolls (2000) found that they omitted obligatory relative markers in subject relative clauses and produced a wrong relative marker in object relative clauses.

Adani et al. (2014) found that children with DLD learning English are more accurate in Subject relative sentences than in Object relative sentences. When the NPs had different number features, children with DLD were more accurate than in match conditions in both sentence types and for all groups. They developed a qualitative study of the errors found in the answers of typically developing children and children with DLD, and found that typically developing children are very accurate for Subject relative sentences. However, typically developing children have the tendency to produce relative clause Errors (RCE), which consist in interpreting Object relative sentences as Subject relative sentences. Grillo (2008) proposes that this error is due to the requirement to interpret the relationship between the head of the relative clause and its copy, which has to cross the embedded subject. Even though this effect of intervention is found until the age of 4;0, we cannot find a ceiling effect in older children.

On the other hand, children with DLD commit many main clause errors (MCE) in SS sentences (Adani et al., 2014). When children with DLD misinterpreted the sentences, they rely on the linear word order. Adani et al. (2014) propose that this is because children with DLD have difficulties to compute movement derived dependencies. They argue that the data support the Computational Grammatical Complexity hypothesis (CGC). This hypothesis proposes that the impairment in DLD is restricted to non-local dependencies at the clause level (Van der Lely, 1998, 2005). Therefore, it predicts difficulties in subordinate clauses, wh-questions and passive sentences. Local syntactic dependencies, like specifier-head agreement, should be preserved. Children should produce more accurate relative clauses when number features between the main sentence and the relative clause are mismatched. In this respect, Adani et al. (2014) propose the notion of "movement optionality" to explain the fact that children with DLD interpret SR and OR sentences above chance. However, these authors propose that specifier-head agreement is preserved in children with DLD. In production, some of the strategies that children with DLD usually apply are simple declarative sentences and coordinated sentences. Stavrakaki (2001, 2002) explains this strategy as a last resort processing strategy: children interpret subject-verb relations as locally as possible, without taking clause boundaries into account. Compared to typically developing children, children with DLD produce three types of errors: main clause errors (MCE), relative clause errors (RCE) and double clause errors (DCE); therefore, children with DLD use different facilitative strategies, compared to typically developing children, who use predominantly relative clause errors. All these data can be helpful for therapy, since using different number features among DPs can facilitate sentence comprehension.

To conclude, data on the comprehension of subject and object relatives in Spanish, are analyzed and compared to other languages like Italian, Catalan and French. In addition, data from the production of object relatives in Spanish, Italian, Catalan and French are discussed, where children show a slower pace compared to Spanish speaking children, due to Direct Object Marking. I compared the performance on postverbal subjects, which is relevant compared to other languages, since Spanish has a Direct Object Marker (DOM). I also compared these structures with the contrast of subject and object wh-questions in Italian, English and Hebrew since interrogative sentences also have locality restrictions. The results show a locality effect, where children have many difficulties with sentences containing object relatives, especially when the subject and the moved object constituent have similar morphological features. The results bear out Relativized Minimality Hypothesis, since this Hypothesis describes the data found better than alternative theories, mainly with respect to the fact that locality effects are not found with sentences containing subject relatives. Furthermore, these contrasts have been paralleled with data from Second Language Acquisition and from Developmental Language Disorder when the L1 is a head initial language. More research is needed in related fields like literacy, since it has been found that the amount of exposure to written language can be relevant to improve the acquisition of object relatives (Dąbrowska et al., 2022); language attrition, where Merino (1983) found that children have more difficulties on object relatives that subject relatives in bilingual English/Spanish bilingual children; or narratives, where Dasinger and Toupin (1994) found a significant relation between the development of relatives clauses and narratives in a crosslinguistic study.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Rosa María Martín Aranda, Dean of Research, Universidad Nacional de Educación a Distancia. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin. Written informed consent was obtained from the individual(s), and minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article.

Author contributions

VT: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix

(1) OS DM el caballo que está cazando a los leones.
"The horse that is chasing the lions".

(2) OO DM el camello que los elefantes están siguiendo.
"The camel that the elephants are following".

(3) OS DM el mono que está lavando a los osos.
"The monkey that is washing the bears".

(4) OO DM El perro que las niñas están mirando.
"The dog that the girls are looking at".

(5) OS DM la tortuga que está siguiendo a los peces.
"The turtle that is chasing the fish".

(6) OO DM el cisne que los pollos están picoteando.
"The swan that the chicks are pecking".

(7) OS DM la pantera que está empujando a los elefantes.
"The panther that is pushing the elephants".

(8) OO DM el gato que las ranas están mojando.
"The cat that the frogs are watering".

(9) OO DM PS la tortuga que están siguiendo los peces.
"The turtle that the fish are chasing".

(10) OS SM la gallina que está picando al pollito.
"The chicken that is pecking the chick".

(11) OO SM el pato que el conejo está cazando.
"The duck that the rabbit is chasing".

(12) OS SM el niño que mira a la princesa.
"The boy that looks at the princess".

(13) OO SM el policía que la mujer está mirando.
"The policeman that the lady is looking at".

(14) OS SM la gallina que sigue a la tortuga.
"The chicken that is following the turtle".

(15) OO SM la vaca que la oveja está empujando.
"The cow that the sheep is pushing".

(16) OS SM la niña que está mirando al policía.
"The girl that is looking at the policeman".

(17) OO SM la vaca que el caballo está cazando.
"The cow that the horse is chasing".

(18) OO SM PS la tortuga que está siguiendo el pez.
"The turtle that the fish is chasing".