

PP RELATIVE CLAUSES AND INTERVENTION EFFECTS: COMPARING UNERGATIVE AND WEATHER VERBS

RELATIVAS PP E EFEITOS DE INTERVENÇÃO: COMPARANDO VERBOS
INERGATIVOS E METEOROLÓGICOS

RELATIVAS PP Y EFECTOS DE INTERVENCIÓN: COMPARACIÓN DE VERBOS
INERGATIVOS Y METEOROLÓGICOS

Marina R. A. Augusto*

Universidade do Estado do Rio de Janeiro

Elaine Grolla**

Universidade de São Paulo

Erica dos Santos Rodrigues***

Pontifícia Universidade Católica do Rio de Janeiro

ABSTRACT: The asymmetry between subject and object relative clauses has been attested in processing studies with adults (WANNER; MARATSOS, 1978; WARREN; GIBSON, 2002) and children (UTZERI, 2007; ADANI; SEHM; ZUKOWSKI, 2012). From the perspective of language acquisition, Friedmann, Belletti and Rizzi (2009) have suggested a formal treatment for this asymmetry in terms of intervention, and Costa *et al.* (2015) have expanded the proposal to PP relatives, considering data from European Portuguese. This study broadens that discussion by means of an elicitation experiment with 4 and 5-year-old children,

* Doutora em Linguística pela Universidade Estadual de Campinas. Docente na graduação e na pós-graduação em Letras da Universidade do Estado do Rio de Janeiro (UERJ). Integrante da equipe do LAPAL – Laboratório de Processamento e Aquisição da Linguagem da PUC-Rio. Bolsista do Prociência da FAPERJ/UERJ. E-mail: marinaaug@uerj.br.

** Doutora em Linguística pela Universidade de Connecticut e livre docente pela Universidade de São Paulo. Professora do Departamento de Linguística da Universidade de São Paulo (USP) e orientadora do Programa de Pós-Graduação em Semiótica e Linguística Geral (DL/USP). É coordenadora do Laboratório de Estudos em Aquisição de Linguagem (LEAL/USP) e bolsista de produtividade em pesquisa do CNPq. E-mail: egrolla@usp.br.

*** Doutora em Letras (2006). Docente do Depto. de Letras da PUC-Rio desde 1992, com atuação na graduação e no PPG em Estudos da Linguagem. Integrante da equipe do LAPAL - Laboratório de Processamento e Aquisição da Linguagem e do INCog- Grupo de Pesquisa Interdisciplinar em Neurociências e Cognição, na PUC-Rio. E-mail: ericasr@puc-rio.br.

speakers of Brazilian Portuguese. We contrast PP relatives with unergative verbs, showing intervention, and weather verbs, without intervention. Statistically significant differences between the types of verbs were obtained for younger children. We suggest that processing costs related to the availability of alternative less complex structures in the language is a major factor to be considered. This factor may impact the explanatory power of the intervention hypothesis.

KEYWORDS: Language acquisition. Intervention effects. PP Relatives.

RESUMO: A assimetria entre relativas de sujeito e de objeto tem sido atestada nos trabalhos sobre processamento com adultos (WANNER; MARATSOS, 1978; WARREN; GIBSON, 2002) e em aquisição da linguagem (UTZERI, 2007; ADANI; SEHM; ZUKOWSKI, 2012). No âmbito da aquisição, Friedmann, Belletti e Rizzi (2009) sugeriram um tratamento formal, em termos de efeitos de intervenção e Costa *et al.* (2015) expandiram o alcance da proposta para relativas PP, considerando dados do português europeu. Este trabalho amplia essa discussão, a partir de um estudo de eliciação com crianças de 4-5 anos falantes de português brasileiro, contrastando relativas PP, com verbos inergativos, com intervenção, e meteorológicos, sem intervenção. Nossos resultados indicam diferenças entre esses tipos de verbos para crianças mais novas. Sugere-se que o alcance explicativo da hipótese da intervenção pode ser impactado ao se considerarem custos de processamento na produção vinculados à disponibilidade de estruturas alternativas, menos complexas, na língua.

PALAVRAS-CHAVE: Aquisição da linguagem. Efeitos de intervenção. Relativas PP.

RESUMEN: La asimetría entre relativas de sujeto y de objeto ha sido atestada en los trabajos sobre procesamiento con adultos (WANNER, MARATSOS, 1978, WARREN, GIBSON, 2002) y en los de adquisición del lenguaje (UTZERI, 2007; ADANI; SEHM; ZUKOWSKI, 2012). En el ámbito de la adquisición, Friedmann, Belletti y Rizzi (2009) sugirieron un tratamiento formal, mediante la noción de efectos de intervención, y Costa *et al.* (2015) ampliaron el alcance de esa propuesta para relativas PP. En este trabajo se extiende esta discusión, a partir de un estudio de elicitación con niños de 4-5 años, hablantes de portugués de Brasil, en que se contrastan relativas PP con verbos inergativos - con intervención y verbos meteorológicos, sin intervención. Nuestros resultados indican que hay diferencias entre esos tipos de verbos para niños más pequeños. Se sugiere que el alcance explicativo de la hipótesis de la intervención puede ser impactado si se consideran costos de procesamiento en la producción vinculados a la disponibilidad de estructuras alternativas, menos complejas, en la lengua.

PALABRAS CLAVE: Adquisición del lenguaje. Efectos de intervención. Relativas PP.

1 INTRODUCTION

Processing and acquisition studies have pointed out that object extraction is harder to cope with than subject extraction in Wh-interrogatives or relative clauses formation. Thus, adults find subject relative clauses (SubjRCs, such as (1)) easier to process than direct object relatives clauses (DORCs, such as (2))¹ (WANNER; MARATSOS, 1978; TRAXLER; MORRIS; SEELY, 2002; WARREN; GIBSON, 2002; GIBSON *et al.*, 2005). The same holds for child language: children seem to have more difficulty to comprehend and to produce DORCs than SubjRCs (DE VILLIERS *et al.*, 1979; GOODLUCK; TAVAKOLIAN, 1982; HAMBURGER; CRAIN, 1982; CORRÊA, 1995; LABELLE, 1990; GUASTI; CARDINALLETTI, 2003; UTZERI, 2007; BELLETTI; CONTEMORI, 2010; ADANI; SEHM; ZUKOWSKI, 2012; GROLLA; AUGUSTO, 2016; MARTINI *et al.*, 2018):

- | | | |
|-----|---|----------|
| (1) | The girl [that ____ invited the boy]... | (SubjRC) |
| (2) | The girl [that the boy invited ____]... | (DORC) |

The processing literature has addressed the issue for the adult population in terms of (i) distance between the filler and the gap, and (ii) the nature of the intervening element (WANNER; MARATSOS, 1978; GORDON; HENDRICK; JOHNSON, 2001, 2004;

¹ Studies in language acquisition have mainly referred to subject and object relative clauses as SS, SO, OS, OO, where the syntactic position of the head of the RC is identified both in relation to the main clause and in relation to its position inside the RC. For ease of exposition, it is often common also to identify the type of RC based only on the position of the head inside the RC. Although it seems a little awkward, as brought up by one of the reviewers (since the syntactic function of the RC is of an adjoined nominal modifier), in this study we follow the literature referred in the paper and adopt SubjRCs and DORCs as a reference to the syntactic function of the head inside the RC.

GORDON; HENDRICK; LEVINE, 2002). The longer the distance between the filler and the gap, the harder it is to process the RC. Moreover, the similarity between the head of the RC and intervening elements affects processing, causing an interference effect.

A strikingly similar reasoning has recently been proposed by Friedmann, Belletti and Rizzi (2009) in order to account for the asymmetry between SubjRCs and DORCs in language acquisition in terms of differences between children's and adults' grammars in dealing with object A'-dependencies. The difficulty with DORCs is ascribed to the presence of an intervener – the subject of the RC (the boy, in (2)) - between the original position of the relativized element and its final landing site. See section 1 for further details on these proposals.

Based on Friedmann, Belletti and Rizzi (2009), Costa *et al.* (2015) have shown that PP relative clauses (PPRCs) (3) (example (1) in Costa *et al.* (2015)) are also as hard as DP DORCs for children. Drawing on data from European Portuguese (EP), the authors propose that the presence of a DP intervener seems to make the task harder regardless of the fact that a PP or a DP has been moved.

- (3) Mostra-me o menino (em) que o macaco toca.² (EP)(PPRC)
 Show me the boy on that the monkey touches
 'Show me the boy the monkey touches (on)'

The present study focuses on the production of PPRCs by Brazilian Portuguese-speaking children and aims to contribute to the debate about the role intervention elements play in explaining children's data, as argued for by Friedmann, Belletti and Rizzi (2009). Thus, the present study has two aims: (i) to provide results for Adjunct PPRCs differentiated in terms of the presence of an intervener - an issue not dealt with in the literature yet; and (ii) to argue that it is not possible to ignore processing demands in explaining children's data.

We point out that a theory in terms of differences in child and adult grammars, such as Friedmann, Beletti and Rizzi's, ends up overloading the grammar unnecessarily. Processing limitations widely observed in different adult populations may already capture, in terms of developing processing abilities, the difficulties children show.

In the experiment we have conducted, two types of verbs have been contrasted: intransitive (unergative) and impersonal weather verbs. In Portuguese, sentences with intransitive verbs in PPRCs present a DP intervener subject (4), whereas sentences with weather verbs present an expletive *pro* subject (5).

- (4) Eu escolho os castelos (em) que/onde o vampiro mora pp ____.
 I choose the castles in that/where the vampire lives
 'I choose the castles where the vampire lives.'
- (5) Eu escolho as cidades (em) que/onde *pro* chove muito pp ____.
 I choose the cities in that/where *pro* rains a lot
 'I choose the cities where it rains a lot.'

The predictions are then that sentences with intransitive verbs – which show a DP intervening subject – will be harder for children to produce than their counterparts with weather verbs, which display a null subject, thus not an intervening DP subject.

The remainder of this paper is organized as follows. In Section 1, the main accounts in the psycholinguistics literature and the proposal by Friedmann, Belletti and Rizzi (2009) as well as the results obtained in Costa *et al.* (2015) are presented. Section 2 presents the experiment conducted on PPRCs, with and without an intervening element, with Brazilian Portuguese-speaking children. A discussion about the role intervening elements play in explaining children's data is also provided. The last section brings our final remarks.

² Preposition omission is attested in children's production, which is considered to be an additional strategy children resort to in order to cope with harder dependencies. Costa *et al.* (2015) also brings data from child Hebrew, but for the purpose of this study, we will focus on data from European Portuguese only. See next section for a more detailed presentation of these data.

2 COMPLEXITY OF RELATIVE CLAUSES AND INTERVENING ELEMENTS

In psycholinguistic literature, the different demands imposed by relative clauses are dealt with in terms of the distance between the filler and the gap and the nature of the intervening element. Regarding distance, memory cost has been considered, as Phillips, Kazanina and Abada (2005) emphasize in the following passage:

[...] it is [...] clear from the psycholinguistic literature that shorter wh-dependencies are preferred over longer wh-dependencies, all other things being equal. Processing a wh-filler leads to the creation of an incomplete syntactic dependency, and the prediction of a thematic-role assigner, typically a verb that will allow completion of the dependency. This syntactic prediction must be maintained in working memory, and it is assumed that the cost of maintaining this prediction (memory cost or storage cost) increases as additional linguistic material is processed, leading to a distance-sensitive cost function. When the thematic-role assigning verb is processed, the filler must be integrated with the verb to complete the dependency. It is assumed that the process of integration requires a fixed amount of resources for performing the syntactic and semantic integration itself, plus an amount of resources for first reactivating the filler in working memory that is proportional to the distance between the filler and the verb. Thus, the completion of the filler-gap dependency is also assumed to involve a distance-sensitive cost function [...] The preference for shorter wh-dependencies under this approach is therefore a special case of a general attempt to minimize the usage of working memory resources at each step of processing. (PHILLIPS et al., 2005, p.48-409).

The distance factor accounts for part of the difficulty to produce DORCs over SubjRCs. Moreover, it has also been observed that DORCs with a relativized DP having an intervening full DP as the subject of the relative clause are harder to process than DORCs with a null or pronominal subject. This difficulty can also be explained based on processing difficulties. According to Gordon and colleagues (GORDON; HENDRICK; JOHNSON, 2001, 2004; GORDON; HENDRICK; LEVINE, 2002), when the head NP and the embedded NP are of the same type (e.g., both are common nouns or proper names), an interference effect occurs due to the load of maintaining both NPs retained in memory during processing. This load would be lessened if the embedded NP is an indexical pronoun.

The literature on language acquisition has recently resorted to this interference of an NP subject in order to explain children's attested difficulty with DORCs from a formal perspective. Friedmann, Belletti and Rizzi (2009) have proposed that DORCs are harder for children than SubjRCs due to the presence of the intervening subject – D NP1 – between the head of the relative clause (D NP2) and the gap inside the object relative clause (<D NP2>):

- (6) ... the boy₂ that the girl₁ invited <the boy₂>
 D NP₂ R ... D NP₁ <D NP₂>

The problem arises if both the target and the subject are lexically restricted. When either the intervener or the target does not carry a lexical restriction, as in free relatives or in the presence of an impersonal *pro* subject (in languages that allow it such as Hebrew (7)), children show adult behavior, less difficulty (FRIEDMANN; BELLETTI; RIZZI, 2009, example (12) in the original, p. 75):

- (7) Tare li et ha-sus she-mesarkim oto.
 Show to-me ACC the-horse that-brush-pl him
 'Show me the horse that someone is brushing.'

Based on the Relativized Minimality Principle (RIZZI, 1990)³, Friedmann, Belletti and Rizzi (2009) argue that the extent to which the principle would apply differs for adults and children. Adults are able to handle structures where the features of the intervener

³ In a configuration like (i) "a local relation between X and Y fails if the intervener Z bears a certain structural similarity to X, or, more precisely, Z belongs to the same structural type as X" (FRIEDMANN; BELLETTI; RIZZI, 2009, p. 82).

(i) X... Z... Y

and the target are in an inclusion relation, but children require disjunction of the features (chart provided by the authors, schema (29), p. 84):

(8)	Adult grammar	Child grammar	
a) +A +A <+A>	*	*	(identity)
b) +A,+B..... +A <+A,+B>	ok	*	(inclusion)
c) +A +B <+A>	ok	ok	(disjunction)

The results from Hebrew-speaking children tested for comprehension and production of SubjRCs and DORCs, reported in Friedmann, Belletti and Rizzi (2009), seem to support their proposal. According to the authors: “subject relatives were comprehended significantly better than object relatives, $t(52) = 9.06$, $p < .001$.” Additionally, when no intervening element was present, as in free relatives, “group-level performance ... was above chance”, as well as for “object relatives with the arbitrary *pro* [which] were comprehended significantly better than the headed object relatives, $t(21) = 5.93$, $p < .0001$.”

As far as production is concerned, the authors state that: “There were significantly more grammatical productions of subject relatives than of object relatives, $t(21) = 3.01$, $p < .01$,” Hebrew-speaking children avoided DORCs, resorting to subject relative clauses, free relatives, impersonal *pro* subjects, resumptive pronouns and resumptive DPs. Inadequate responses in which reversed theta roles are instantiated were also found.

More recently, Costa *et al.* (2015) have shown that PP relative clauses (see (3) above) are also as hard as DP direct object relative clauses for children, based on data from European Portuguese (EP) as well as Hebrew. They argue then that the presence of a DP intervener makes the task harder regardless of the fact that a PP or a DP is moved. Moreover, the grammatical function of the PP (adjunct or complement) is also irrelevant.

The authors point out though that, in EP, the rate of success in producing PPRCs is similar to the rate of success in producing DORCs, once preposition omission is controlled for. Costa *et al.* (2015) argue that preposition omission is independent of intervention effects, constituting an additional strategy to cope with harder dependencies. Compare (9) and (10):

- (9) ... o menino **em** que o macaco toca. (EP)(PPRC)
 ... the boy on that the monkey touches.
 ‘... the boy the monkey touches (on).’
- (10) ... o menino que o macaco toca. (EP) (PPRC)
 ... the boy that the monkey touches. (preposition omission)
 ‘...the boy the monkey touches (on).’

Table 1 (Table 2, in the original paper) shows the percentage of the production of target responses, considering both standard PPRCs and PPRCs with preposition omission in EP (COSTA *et al.*, 2015, p. 40):

	Target DP Object Relatives	Target PP Object Relatives + P-omission Relatives
4-year-olds	21.7%	17.6%
5-year-olds	29.2%	30.6%

Table 1: rates of production of relative clauses in child EP (4 year-olds, N=20, 5-year-olds N=20).

Table 1 shows that the rates of production of DORCs and PPRCs are similar once relatives with preposition omission are taken as target responses. Based on these results, the authors conclude that PPRCs are also impacted by the presence of an intervening element and that relatives with preposition omission should also be considered in order for a clearer picture to be obtained.

Turning now to BP, we observe that this language also makes use of preposition omission in PPRCs not only in child language but also in adult language. Thus, it seems relevant also to consider this type of strategy as used by children. This will be taken into account in the experiment conducted with Brazilian Portuguese-speaking children in a production task aiming at eliciting adjunct PPRCs with intransitive and weather verbs.

These extremely interesting data on child language indicates that there is indeed some asymmetry between SubjRCs and DORCs in children's production and comprehension data; so intervention effects seem to be operative. Both processing accounts and a theory in terms of feature disjunction can explain children's linguistic behavior. Our study will further expand the range of data and languages studied, bringing the results of an experiment – conducted with Brazilian Portuguese-speaking children – which elicits PPRCs with intransitive and weather verbs.

The next section presents the experiment.

3 EXPERIMENT: CONTRASTING INTRANSITIVE AND WEATHER VERBS IN PPRCS

An elicitation task was designed for the production of adjunct PPRCs with intransitive and weather verbs sentences. In adjunct PPRCs with intransitive verbs, there is a DP intervener (see (4), repeated as (11)), whereas in adjunct PPRCs with weather verbs, there is a *pro* subject, thus not an intervening DP (see (5), repeated as (12)):

- (11) Eu escolho os castelos (em) que/onde **o vampiro** mora pp____.
 I choose the castles in that/where the vampire lives.
 'I choose the castles where the vampire lives.'

- (12) Eu escolho as cidades (em) que/onde **pro** chove muito pp____.
 I choose the cities in that/where *pro* rains a lot.
 'I choose the cities where it rains a lot.'

The prediction is that sentences with intransitive verbs – which show a DP intervening subject – will be harder for children to produce than their counterparts with weather verbs, which display a null subject, thus not an intervening DP subject.

Our research questions are then the following:

- (i) Will PPRCs with intransitive verbs – with a DP intervener – induce fewer target-responses than PPRCs with weather verb sentences – with no intervener – in children's production?
- (ii) Are there specific strategies that children acquiring BP resort to in order to avoid PPRCs with interveners?

The independent variables of the experiment were (i) the type of verb used in an eliciting preamble: intransitive verb and weather verb; (ii) age of the participants: 4 and 5-year-old children; adults (as a control group).

All the participants saw the two conditions of the first variable (within-subjects factor) and there were 6 trials for each condition. Each participant answered a total of 12 items. There were also 3 pre-test trials for the children to get familiarized with the task. The dependent variable was the number of target-responses (relative clauses with or without preposition) produced for each condition.

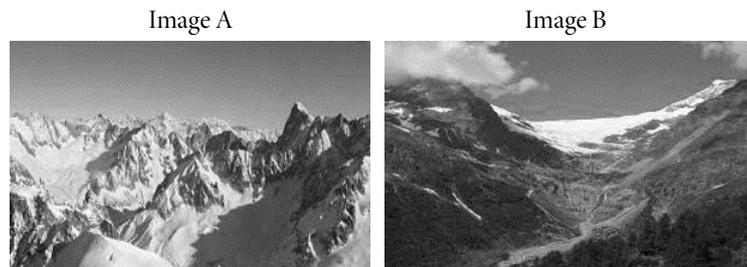
Method:

Participants: Thirty (30) children, divided into two age groups, participated in the experiment: (i) 4 year-olds (3;11-4;9/Mean age:4;2/6 male); (ii) 5 year-olds (4;11-5;10/Mean age:5;4/8 male). The control group was constituted by fifteen (15) undergraduate students (mean age: 22 years old/ 8 male).

Task and procedure:

The production of relative clauses was evaluated using an elicitation task in which participants heard a brief description involving two elements of the same kind and had to answer a question indicating their preference towards one of them. The task was performed as a game: images representing the two elements were exhibited side by side in a computer screen while the eliciting text was orally presented. The game consisted in verifying if a Genius of the Lamp could guess the preference of the child. After the child completed the target sentence, the choice of the Genius was shown, and the experimenter initiated a new trial. The example below illustrates the weather verb. The complete list of stimuli used for each condition is provided in Appendix 1.

- (13) *Experimenter: Veja essas montanhas. Neva muito nessas montanhas aqui (imagem A) e neva pouco nessas outras montanhas (imagem B). Que montanhas você escolhe? Conte para o Gênio.*
(Look at these mountains. It snows heavily in these mountains here (image A) and it snows little in these other mountains (image B). Which mountains do you choose? Tell the Genius.)



Expected child response: Eu escolho as montanhas (em) que/onde neva muito/pouco. (I choose the mountains (in) which/where it snows a lot/a little).

Results

The elicitation task was highly effective, with children and adults producing a large number of relatives. Below, we present the types of responses provided by our subjects:

Standard Relative (target-response)

- (14) a. ... os estádios em que o Brasil jogou (L. 18 years)
 ... the stadiums in that the Brazil played
 '...the stadiums where Brazil has played.'
- b. ... as praias em que venta muito (J. 19 years)
 ... the beaches in that winds a lot
 '... the beaches where it winds a lot.'

Chopped Relative (preposition omission) (target-response)

- (15) a. ... *as praias que o golfinho nada* (S. 4;8 years)
 ... the beaches that the dolphin swims
 ‘... the beaches where the dolphin swims.’
- b. ... *as florestas que não neva* (J. 5;8 years)
 ... the forests that not snow
 ‘... the forests where it doesn’t snow.’

Topic-subject (plural agreement)

- (16) ... *as montanhas que não nevam* (S. 4;8 years)
 ... the mountains that not snow^{3rd person plural}
 ‘... the mountains where it doesn’t snow.’

Use of PPs/adjectives/gerunds

- (17) a. ... *os castelos do vampiro* (M. 4;1 years)
 ... the castles of the vampire
 ‘... the vampire’s castles’
- b. ... *as montanhas com pouca neve* (F. 5;10 years)
 ... the mountains with little snow
 ‘... the mountains with little snow’
- c. ... *as almofadas limpas* (B. 5;7 years)
 ... the cushions clean
 ‘... the clean cushions’
- d. ... *as praias ventando pouco* (M.; 3;11 years)
 ... the beaches winding little
 ‘... the beaches where it is winding a little’

Change of verb – subject relative

- (18) a. ... *as praias que têm golfinho* (B. 4;9 years)
 ... the beaches that have dolphin
 ‘... the beaches where there are dolphins.’
- b. ... *as montanhas que são mais geladas* (T. 3;11 years)
 ... the mountains that are more cold
 ‘... the mountains that are colder.’

Non-valid response (no response, echo response, singular antecedent)

- (19) a. ... não sei (D. 3;8 years)
... don't know
'...I don't know.'
- b. ... *neva mais* (H. 5;7 years)
... snows more
'... snows a lot.'
- c. ... *a floresta que não neva* (B., 5;1 years)
... the forest that not snow.
'...the forest where it doesn't snow.'

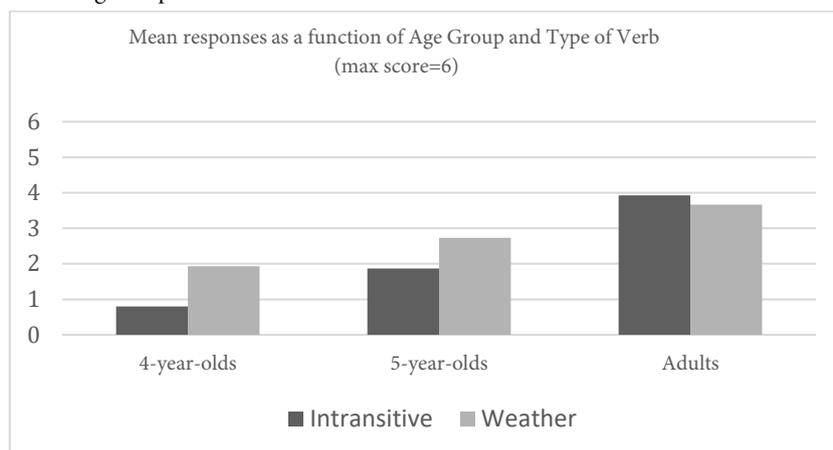
The percentages of the main types of responses are presented in table 2:

	4 year-olds		5 year-olds		Adults	
	Intr.	Weather	Intr.	Weather	Intr.	Weather
Standard (with and without Prep)	13,95%	32,22%	36,84%	45,56%	74,68%	61,11%
Plural agreement	N/A	15,56%	N/A	18,89%	N/A	31,11%
PP	58,14%	13,33%	31,58%	1,11%	24,05%	2,22%
Change of verb	18,60%	28,89%	6,58%	12,22%	1,27%	5,56%
Others	9,3%	10%	25%	22,22%	-	-

Table 2: Percentages of the main types of responses

We would like to point out that a distinct behavior concerning the production of PPRCs target-responses with intransitive and weather verbs is more salient for 4-year-olds than for 5-year-olds (see statistical results below). Table 2 also shows that both 4 and 5-year-olds (as well as adults) resort to the topic-subject (plural agreement) construction for weather verbs. Particularly for 4-year-olds, the use of simple PPs is the preferred option for intransitive verbs. However, it is also a common strategy for both 5-year-olds and adults.

We turn now to the mean of target responses for adults and children:



Graph 1: mean target responses by age group and type of verb (N=45)

The rate of target responses increases with age for both types of verbs. 4-year-olds present the lowest rates of target responses, especially for intransitive verbs that display DP interveners.

An ANOVA calculated on the target-responses considered *Type of verb* (intransitive or weather verb) as a within-subjects factor and *Group* (4, 5-year-olds and adults) as a between-subjects factor. A significant effect for *Group* was obtained ($F(2,42) = 17,9$ $p < 0,000002$). No main effect for *Type of Verb* ($F(1,42) = 3,50$ $p < 0,068$) or an interaction between *Group* and *Type of Verb* ($F(2,42) = 1,93$ $p < 0,157$) were obtained.

Pairwise comparisons show, though, significant difference between intransitive and weather verbs for 4-year-olds ($t(14)=2,54$ $p < 0,0235$ (2-tail)/ $p < 0,012$ (1-tail)), but just a tendency for 5-year-olds when considering a 1-tailed test ($t(14)=1,71$ $p < 0,1087$ (2-tail)/ $p < 0,054$ (1-tail)). No difference was obtained for adults ($t(14)=0,42$ $p < 0,6813$ (2tail)).

4 DISCUSSION

Going back to our research questions, let us first restate them: (i) Will PPRCs with intransitive verbs – with a DP intervener – give rise to fewer target-responses than PPRCs with weather verb sentences – with no intervener – in children’s production?, and (ii) Are there specific strategies that children acquiring BP resort to in order to avoid PPRCs with interveners?

It is possible to answer the first question affirmatively. There are significantly more PPRCs target-responses with weather verbs than with intransitive verbs, particularly for 4 year-olds; for 5 year-olds, there is a tendency in this direction. No difference was observed for adults.

In relation to the second research question, Table 2 indicates that the answer is ‘yes’. 4 year-olds present a large proportion of PP responses for intransitive verbs (58%) (*Eu escolho os castelos do vampiro/I choose the castles of the vampire*). 5 year-olds also make use of this strategy, but to a lesser extent (31%). When we consider weather verbs, the rate of PP responses drops to 13% for 4 year-olds and to 1% for 5 year-olds. For this kind of verb, we detected a developmental trend in the use of an innovative structure in BP, the topic-subject (plural agreement) construction, with 4 year-olds producing 15% of them, 5 year-olds producing 19% and adults, 31%. It is also worth pointing out a change of nearly 30% on verb responses for 4-year-olds for weather verbs (*eu escolho as montanhas que tem/têm um monte de neve/I choose the mountains that have a lot of snow*).

In sum, the use of PPs for intransitive verbs and topic-subject construction for weather verbs stand out. PPs are favored over an RC. In what follows, we turn our attention to the topic-subject (plural agreement) construction, which was frequently produced by our participants:

- (20) *Eu escolho as cidades que chovem muito.*
 I choose the cities that rain_{3rd person plural} a lot
 ‘I choose the cities where it rains a lot.’

This construction is derived from a left-dislocated structure, where the locative or temporal left-dislocated DP triggers verbal agreement (AVELAR; GALVES, 2011; MUNHOZ; NAVES, 2012; PILATI; NAVES, 2012). This can be clearly seen when the dislocated element is plural. The dislocated element ‘loses’ its preposition, and what is observed in the left periphery is a DP element:

- (21) *Essas cidades chovem muito.*
 these cities rain_{3rd person plural} a lot
 ‘It rains a lot in these cities.’

The structure without left-dislocation ((22) below) has a locative PP in canonical position, and there should be a null expletive in subject position triggering singular agreement on the verb:

- (22) *pro Chove muito nessas cidades.*
 pro rains a lot in these cities
 'It rains a lot in these cities.'

The relative clause formed from the left-dislocated structure in (21) is deprived of an intervening element, being actually a SubjRC⁴:

- (23) *Eu escolho as cidades_i que [aP _____i [TP chovem [AdvP muito]]]*
 I choose the cities that rain_{3rd person plural} a lot
 'I choose the cities where it rains a lot.'

As mentioned before, both adult and child speakers produced this kind of structure in our study, although children produced it at lower rates. Previous experimental studies on weather verbs conducted with adult speakers of BP (COSTA, 2013; COSTA; AUGUSTO; RODRIGUES, 2014) have also found that speakers produce and accept them.

5 GENERAL DISCUSSION

The distinct behavior concerning structures with or without intervening elements has been treated in the majority of the acquisition studies in the literature by means of the stricter version of Relativized Minimality (FRIEDMANN; BELLETTI; RIZZI, 2009), presented above. However, we would like to point out that this explanation does not seem to capture the whole picture. On one hand, it does not explain the relatively high rate of production of relatives with interveners (around 30% in studies focusing on DORCs; about 14% with intransitive verbs in the present study with the younger children). If children are constrained as Friedmann, Belletti and Rizzi (2009) claim, we should expect them to produce no relatives with interveners or at least, much lower rates than what was attested. On the other hand, structures without interveners should be produced at higher rates, what was not obtained in this study for PPRCs with weather verbs (32% for 4 year-olds and 45% for 5 year-olds).

Moreover, the availability of different alternative structures able to express the content that RCs convey also add to the picture. It is not possible to refer to intervention effects for production data without considering valid alternatives the language provides for each type of RC. PPRCs with intransitive verbs gave rise to simpler structures (simple PPs) more often than PPRCs with weather verbs, for which plural agreement structures stood as one of the preferred alternatives. Younger children stick more frequently to simpler structures than older children, but adults also make use of these alternatives considerably (24% of simple PPs for PPRCs with intransitive verbs in this study). They also usually resort to more pragmatically felicitous alternatives when prompted to produce RCs, as passives are often reported as an alternative in DORCs.⁵

An alternative explanation that seems more feasible is that children (as well as adults, to some extent) resort to simpler structures whenever possible in order to lessen the burden of processing, as widely attested in processing literature for adults (GENNARI; MACDONALD, 2009; CORRÊA; AUGUSTO; MARCILESE, 2018). It is thus questionable the extent to which an overextension of grammar principles, overloading the grammar unnecessarily, should be favored over processing complexity as an adequate explanation for the kind of results found in language acquisition studies.

⁴ The projection aP has been proposed to host left-dislocated elements (see MIYAGAWA, 2010).

⁵ Usually, when DORCs are elicited, two images are presented side by side, for example, in one of them the grandma hugs the boy and in the other the grandpa hugs the boy. The experimenter asks the participant which boy he would rather be. The expected answers will be: I would rather be the boy that the grandma/grandpa hugs. Observe that in this scenario, there are two potential agents, grandma and grandpa. This is one type of context where a full passive sentence is felicitous as it focuses on the agent chosen (see O'BRIEN; GROLLA; LILLO-MARTIN, 2005 for more discussion). Additionally, the passive also maintains 'the boy' as the topic (I'd rather be the boy that is hugged by the grandma/grandpa). This might be a contributing factor as to why adults frequently resort to this strategy.

6 FINAL REMARKS

This paper aimed at contributing to the debate on the distinction between children's production of different types of relative clauses in terms of the presence of intervening elements (FRIEDMAN; BELLETTI; RIZZI, 2009). It has been shown that RCs without intervening elements (such as SubjRCs) are better comprehended than RCs with intervening elements (such as DORCs). Several studies have also shown that children provide higher rates of target responses when producing RCs with no intervening elements, resorting to different strategies in order to avoid those RCs with intervening elements. Such state of affairs has been shown to extend to PPRCs, also presenting an intervening element (COSTA *et al.*, 2015).

In this paper, we focused on PPRCs and the possibility of having or not an intervening element. Adjunct PPRCs were elicited, contrasting intransitive verbs (with an intervening subject) and weather verbs (without intervening subject and with expletive *pro*). Our results from this task, administered to 4 and 5 year-olds as well as a group of adults (as a control group), showed that a distinct behavior is attested for 4 year-olds, with more target responses for weather verbs PPRCs, which have no intervening elements. A closer look at the breakdown of responses showed that children resort to different strategies both for PPRCs with intervening elements as well as for PPRCs without them, suggesting that PPRCs are costly structures and production data must be considered in relation to the possible alternative structures each language provides. Simple PPs were often a way-out for producing a valid response for an expected PPRC with intransitive verbs. Topic-subject constructions, typical of Brazilian Portuguese, were also productive for an expected PPRC with weather verbs.

Our proposal is that resorting to less complex structures is a processing strategy, affecting both children and adults. RCs processing costs, which stem from different sources (type of RC, presence and nature of interveners, distance between filler and gap), seem a more promising alternative over a formal account, which overloads the grammar unnecessarily.

REFERENCES

ADANI, F.; SEHM, M.; ZUKOWSKI, A. How Do German children and adults deal with their relatives. *In: STAVRAKAKI, S.; LALIOTI, M.; KONSTANTINOPOULOU, P. (ed.). Advances in language acquisition*. Newcastle: Cambridge Scholars Publishing, 2012. p. 14-22.

AVELAR, J.; GALVES, C. Tópico e concordância em PB e PE. *In: COSTA, A.; BARBOSA, P.; FALÉ, I. (org.) XXVI Encontro Nacional da Associação Portuguesa de Linguística. Textos selecionados*. Lisboa: APL, 2011. p. 49-65.

BELLETTI, A.; CONTEMORI, C. Intervention and attraction. on the production of subject and object relatives by Italian (young) children and adults. *In: COSTA, J.; CASTRO, A.; LOBO, M.; PRATAS, F. (ed.). Language acquisition and development: Proceedings of GALA 2009*. Newcastle: Cambridge Scholars Publishing, 2010. p. 39-52.

CORRÊA, L. M. S. An alternative assessment of children's comprehension of relative clauses. *Journal of Psycholinguistic Research*, v. 24, n. 3, p. 183-203, 1995.

_____; AUGUSTO, M. R. A.; MARCILESE, M. Competing analyses and differential cost in the production of non-subject relative clauses. *Glossa: a journal of general linguistics*, v., n.1, p. 1-22, 2018.

COSTA, I. de O. Verbos meteorológicos no plural em orações relativas do português brasileiro: sintaxe e processamento. 2013. Dissertação (Mestrado) – Departamento de Letras, Pontifícia Universidade Católica do Rio de Janeiro, Rio de Janeiro, 2013.

_____; AUGUSTO, M. R. A.; RODRIGUES, E. dos S. Verbos meteorológicos flexionados no plural e a hipótese da inacusatividade biargumental: explorando a sintaxe do Português Brasileiro. *Veredas* (UFJF. Online), v. 18, p. 257-280, 2014.

COSTA, J. ; FRIEDMANN, N. ; SILVA, C.; YACHINI, M. The acquisition of PP relatives in Hebrew and European Portuguese: another window into the atoms of intervention. In: HAMANN, C.; RUIGENDIJK, E. (Eds.), *Language acquisition and development: Proceedings of GALA 2013*. Newcastle, UK: Cambridge Scholars Publishing, 2015. p.35-48.

de VILLIERS, J.; TAGER-FLUSBERG, H.; HAKUTA, K.; COHEN, M. Children's comprehension of relative clauses. *Journal of Psycholinguistic Research*, v. 8, p. 499-518, 1979.

FRIEDMANN, N.; BELLETTI, A.; RIZZI, L. relativized relatives. types of intervention in the acquisition of A-Bar dependencies. *Lingua*, v. 119, n.1, p. 67-88, 2009.

GENNARI, S.; MACDONALD, M. E. Semantic indeterminacy in object relative clauses. *Journal of Memory and Language* 58. 161–187, 2008.

GIBSON, E.; DESMET, T.; GRODNER, D.; WATSON, D.; KO, K. reading relative clauses in English. *Cognitive Linguistics*, v. 16, n.2, p. 313-353, 2005.

GOODLUCK, H.; TAVAKOLIAN, S. Competence and processing in children's grammar of relative clauses. *Cognition*, v.11, n.1, p. 1-27, 1982.

GORDON, P. C.; HENDRICK, R.; JOHNSON, M. Memory interference during language processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, v. 27, n. 6, p. 1411–1423, 2001.

_____; _____. Effects of noun phrase type on sentence complexity. *Journal of Memory and Language*, v. 51, n.1, p. 97–114, 2004.

_____; _____. LEVINE, W. H. Memory-load interference in syntactic processing. *Psychological Science*, v.13, n. 5, p. 425–430, 2002.

GROLLA, E.; AUGUSTO, M. absolute constructions in Brazilian Portuguese and *Relativized Minimality Effects in Children's Productions*. In: *Proceedings of GALANA VI - Generative Approaches to Language Acquisition North America*. Somerville, MA: Cascadilla Press, 2016. p. 36-47.

GUASTI, M. T.; CARDINALETTI, A. Relative clause formation in romance child production. *Probus*, v.15, n.1, p. 47-88, 2003.

HAMBURGER, H.; STEPHEN, C. Relative acquisition. In: KUCZAJ, S. (ed.) *Language development: syntax and semantics*. Hillsdale, NJ: Lawrence Erlbaum, 1982. p. 245-274.

LABELLE, Marie. Predication, Wh-Movement and the development of relative clauses. *Language Acquisition*, v.1, n.1, p. 95-119, 1990.

MARTINI, K.; BELLETTI, A. ; CONTEMORI, C.; RIZZI, L. On the role of lexical restriction and intervention in production: A new angle on the subject-object relatives asymmetry, *Proceedings of the 1st SynCart Workshop "From maps to principles"*, Special Issue of *Generative Grammar in Geneva (GG@G)*, v. 11, 2018.

MIYAGAWA, S. Why agree? Why move? Unifying agreement-based and discourse configurational languages. *Linguistic Inquiry Monograph* 54, MIT Press, 2010.

MUNHOZ, A.; NAVES, R. Construções de tópico-sujeito: uma proposta em termos de estrutura argumental e de transferência de traços de C. *SIGNUM: Estudos Linguísticos*, Londrina, v. 15, n. 1, p. 245-265, 2012.

O'BRIEN, K.; GROLLA, E.; LILLO-MARTIN, D. Long passives are understood by young children. *Proceedings of the 30th Boston University Conference on Language Development*. Somerville, MA: Cascadilla Press, v. 30, 2005, p. 441 – 451.

PHILLIPS, C.; KAZANINA, N.; ABADA, S. H. ERP effects of the processing of syntactic long-distance dependencies. *Cognitive Brain Research*, v. 22, n. 3, p. 407-428, 2005.

PILATI, E. N. S.; NAVES, R. R. Cisão da categoria pronominal, transferência de traços de C para T e a expressão do sujeito no português brasileiro. In: CONGRESSO INTERNACIONAL DE LINGÜÍSTICA HISTÓRICA, 2., São Paulo, 2012. (Comunicação oral).

RIZZI, L. *Relativized minimality*. Cambridge, MA: The MIT Press, 1990.

TRAXLER, M. J.; MORRIS, R. K.; SEELY, R. E. Processing subject and object relative clauses: evidence from eye movements. *Journal of Memory & Language*, v. 47, n.1, p. 69-90, 2002.

UTZERI, I. The Production and the acquisition of subject and object relative clauses in italian: a comparative experimental study. *Nanzan Linguistics*, Special Issue 3, v. 1, p. 283-313, 2007.

WANNER, E.; MARATSOS, M.. An ATN approach to comprehension. In: HALLE, M.; BRESNAN, J.; MILLER, G. A. (ed.). *Linguistic theory and psychological reality*. Cambridge, MA: MIT Press, 1978. p. 119–161.

WARREN, T.; GIBSON, E. The influence of referential processing on sentence complexity. *Cognition*, v. 85, p. 79-112, 2002.

Acknowledgements

We would like to thank the reviewers for valuable comments and suggestions. Any remaining errors are our own responsibility. We would also like to thank the children who participated in this study and the daycares for their hospitality. This research has been partially funded by the grants: FAPERJ (Prociência/2017) to the first author, and CNPq (308397/2017-7) to the second author.



Received in September 20, 2018. Approved in November 30, 2018.