Object *Wh*-questions with Psych Verbs Are Easy in Child Spanish

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1. Introduction

This study investigates Spanish-speaking children's acquisition of subject and object *d*-linked *wh*-questions with actional (1) and psychological (psych) verbs like '*gustar*' ('like') (2).

(1) a. ¿Qué niña le grita a la maestra?
         which girl 3DAT yell-3SG to the teacher
         'Which girl yells at the teacher?'
     b. ¿A qué niña le grita la maestra?
         to which girl 3DAT yell-3SG the teacher
         'At which girl does the teacher yell?'

(2) a. ¿Qué niña le gusta a la maestra?
         which girl 3DAT likes to the teacher
         'Which girl does the teacher like?'
     b. ¿A qué niña le gusta la maestra?
         to which girl 3DAT likes the teacher
         'Which girl likes the teacher?'

Despite the extensive literature on the acquisition of A'-constructions in English and other Romance languages there is little research on child Spanish and the acquisition of psych verbs. The goals of this study are (i) to investigate subject > object asymmetries in child Spanish, (ii) to provide empirical evidence for the idiosyncratic structure of Romance psych verbs, and (iii) to explore the roles of intervention and input frequency effects.

1.1. Subject > object asymmetries in the acquisition of A'-movement

A consistent finding in the acquisition literature is that children find subject A'-extractions easier to comprehend than object A'-extractions. This subject > object asymmetry has been reported for *wh*-questions (Avrutin 2000, Bentea,

Durrleman & Rizzi 2016, de Vincenzi, Arduino, Ciccarelli & Job 1999, Friedmann, Belletti & Rizzi 2009, Yoshinaga 1996), including sluiced *wh*-questions (Mateu & Hyams 2021), relative clauses (Adani et al. 2010, Belletti, Friedmann, Brunato & Rizzi 2012, Friedmann et al. 2009, Mateu & Hyams 2020, Torrens 2017), and topicalizations (Friedman & Lavi 2006).

For example, Friedmann et al. (2009) tested Hebrew-speaking children aged 3;7-4;10 in a question-picture matching task with semantically reversible verbs (3). Children performed at 78% with subject *which*-questions but at 58% with object *which*-questions.

(3)   a.   <u>Which dog __</u> is biting the cat?
        b.   <u>Which dog</u> is the cat biting __?

There are, to our knowledge, only two experimental studies that have examined the acquisition of subject- vs. object A'-extractions in Spanish-speaking children, both of which investigated relative clauses. Pérez-Leroux (1995) tested 3-6-year-olds in a production task aimed to elicit relative clauses. Children produced more ungrammatical resumptive pronouns and DPs with object relative clauses (ORCs) than subject relative clauses (SRCs). Torrens (2017) tested Spanish-speaking 4-7-year-olds on the comprehension of relative clauses using a picture-matching task and sentences with reversible actional verbs. He also found that children performed better on SRCs (85.13%) than ORCs (61.88%).

1.2. Theoretical explanations for the subject advantage

Different approaches have attempted to explain this asymmetry. Input-frequency-based accounts posit that children use a shallow, word-order-based strategy (e.g., Brandt, Kidd, Lieven & Tomasello, 2009, Diessel 2009, Kidd, Brandt, Lieven & Lieven 2007). Specifically, they argue that because SRCs (and subject *wh*-questions) conform to the canonical word order of the examined languages (i.e., SVO) they are amenable to surface word-order-based interpretive strategies. These child-specific heuristic strategies, however, are misleading when interpreting ORCs (and object *wh*-questions), which typically exhibit a less frequent word order (i.e., OSV), hence the subject advantage observed in different A'-constructions.

Structure-based approaches, on the other hand, argue that children are particularly susceptible to '*intervention effects*' (e.g., Belletti et al. 2012, Friedmann et al. 2009). One way of characterizing intervention effects is by appealing to the locality principle of *featural Relativized Minimality* (fRM; Rizzi 1990, 2004) operative in adult grammar, which claims that the dependency between the moved element (X) and the gap (Y) is disrupted if the intervening element (Z) shares some crucial morphosyntactic feature with X, (4).

(4)   X … Z … <Y>

Moreover, the degree of disruption is a function of the featural distinctness between X and Z. In other words, the greater the overlap in the feature set between X and Z, the greater the penalty. Accordingly, ORCs that have a match in number between X and Z (i.e., both are SG or PL) have been found to be significantly more difficult than those that mismatch in number. Crucially, number match does *not* modulate performance in SRCs, as they do not involve intervention (e.g., Adani et al. 2010, Belletti 2012). Similarly, gender (Adani et al. 2010) and animacy mismatches (Arosio, Guasti & Stucchi 2011, Bentea et al. 2016, Mateu & Hyams 2021) have also been found to ameliorate children's comprehension of object-extracted constructions, but not subject extracted ones.
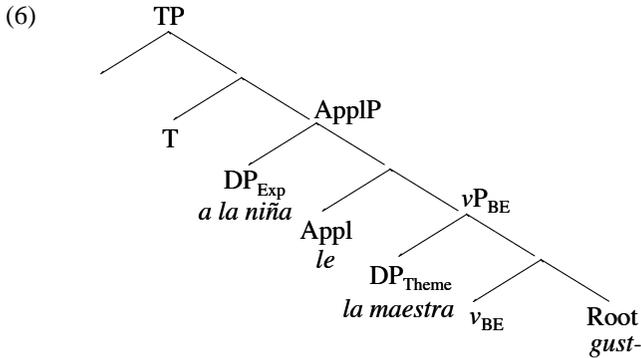
It is our objective to provide evidence in favor or against one of these two theoretical approaches by examining Spanish-speaking children's comprehension of subject- and object-extracted *wh*-questions with actional verbs and also psych verbs such as '*gustar*' ('like/please'), which most typically exhibit a non-canonical OVS order in declarative, broad-focus contexts.

1.3. Spanish psych verbs

Spanish Class III psych predicates (of the *piacere* sort in Belletti & Rizzi 1988, for Spanish see Parodi-Lewin 1991), such as '*gustar*' ('like/please') involve:

(i)   a nominative DP theme with which the verb agrees ('subject')
(ii)   a dative DP experiencer, preceded by 'a' and obligatorily doubled with a dative clitic ('object')
(iii)   a neutral OVS order (Experiencer-Verb-Theme), although SVO (Theme-Verb-Experiencer) is also allowed without prosodic breaks (Belletti & Rizzi 1988, Cuervo 2003, Fábregas, Jimenez-Fernandez & Tubino 2017, Franco & Huidobro 2003, Montrul 1996), as in (5).

(5)   a. Las maestras le   gustan   a   la niña
           the teachers   3DAT like-PRS.3PL to   the girl
       b. A la niña le   gustan   las maestras
           to the girl   3DAT like-PRS.3PL the teachers
           'The girl likes the teachers.'

There is syntactic evidence that the dative experiencer of '*gustar*' asymmetrically c-commands the nominative theme (see Belletti & Rizzi 1988, Cuervo 2003, 2020, Fernández Soriano 1999, Landau 2010, Masullo 1992, Parodi-Lewin 1991). We thus assume the structure represented in (6) (based on Cuervo 2003, 2020).

(6)

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                    TP
            ┌────────┴────────┐
            T              ApplP
                     ┌────────┴────────┐
                  DP_Exp            vP_BE
                 a la niña    ┌───────┴───────┐
                       Appl        DP_Theme
                        le        la maestra
                                        ┌─────┴─────┐
                                      v_BE        Root
                                                  gust-
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DP_{Exp} *a la niña*, Appl *le*, vP_{BE}, DP_{Theme} *la maestra*, v_{BE}, Root *gust-*

1.4. Children's acquisition of Spanish psych verbs

There is surprisingly little research children's L1 acquisition of this type of psych verbs. Two experimental studies have examined children's comprehension of '*gustar*' in Spanish. Soler (2012) tested 3-5-year-olds on children's comprehension of four *gustar*-like verbs using a Truth-Value Judgment Task. The eight target items had either an Experiencer-Verb-Theme order or a Verb-Theme-Experiencer order. Results from the experiment revealed that children performed at approximately the same level with both orders with '*gustar*' –78% with the Exp-Verb-Theme order and 79% with the Verb-Theme-Exp order. The four control items obtained similar scores (78%). Thus, Soler concludes that young children comprehend '*gustar*' regardless of word order.

Torrens, Escobar & Wexler (2006) tested 4-7-year-olds using a task in which children were presented with images and questions involving '*gustar*' and quantifier scope relations. They tested children on two questions with the Experiencer-Verb-Theme order and three questions with the Verb-Theme-Exp order. The 4-year-olds performed at 72% with the order Experiencer-Verb-Theme and at 62.5% with the Verb-Theme-Exp order. By 6 years old, they performed at ceiling (100%) with both orders.

Noticeably, both studies only included sentences with inanimate themes. Children could have used this as a cue to align each DP with the corresponding theta role (i.e., '*niño*' = experiencer, '*globo*' = theme) without requiring them to have an adult-like structure representation. Thus, whether young Spanish-speaking children have a target-like structure for the psych verb '*gustar*' remains an open question. We seek to shed light on children's representation of *gustar*-type verbs by using intervention as a diagnostic tool.
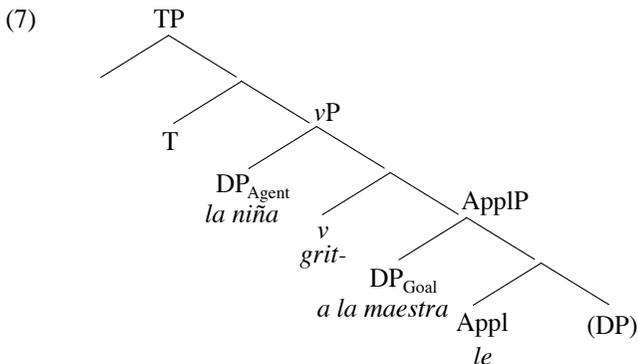
1.5. This study

Both input-frequency and structure-based accounts predict a subject advantage in *wh*-questions with actional verbs in Spanish as well because they do not involve crossing an intervener and because of their canonical word order

(SVO). However, as we argued in Section 1.3., the structure of Spanish psych verbs like '*gustar*' involves an object experiencer that is projected higher than the subject theme. Structure-based accounts thus predict a subject > object asymmetry with actional verbs but an object > subject asymmetry with psych verbs, as outlined in Table 1.

Table 1. Predictions of comprehension by verb type and extraction type according to structure-based accounts.

	Subject-extraction (SVO)	Object-extraction (OVS)
Actional	**Easy** (agent-extraction)	**Difficult** (goal-extraction)
Psych	**Difficult** (theme-extraction)	**Easy** (experiencer- extraction)

Specifically, the actional verbs of the sort we will be examining (*gritar* 'yell', and *leer* 'read') involve a structure in which the agent subject (in Spec,*v*P) is projected higher than the goal object (in specifier of low ApplP), as in (7) (adapted from Cuervo, 2003). Moving the goal object past the agent subject incurs a RM violation and should be penalized in child grammars. In the case of psych verbs, the experiencer object (in specifier of high ApplP) is projected higher than the subject Theme (in Spec,*v*P$_{BE}$), as in (6). Extracting the theme subject past the experiencer object should be difficult for young children due to intervention.

(7)

```
              TP
             /  \
            /    vP
           T    /  \
               /    \
          DP_Agent  ApplP
          la niña   /  \
                   v    \
                 grit-   \
                     DP_Goal  \
                  a la maestra \
                          Appl  (DP)
                           le
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Moreover, specific intervention theories, such as fRM predict that intervention will be mitigated when the intervener has morphosyntactic features distinct from the moved object. In our experimental study (Section 3) we will manipulate [number] to test this prediction. Before discussing our experimental study we present a corpus study examining adult and children's naturalistic productions of *gustar*.

2. Corpus Study

In this first study we ask: What is the more frequent word order with the verb '*gustar*' in child-directed speech? Do children produce each order in the same proportion as their input? If not, what order do they tend to use more?

In order to answer these questions, we extracted all the instances of the verb '*gustar*' produced by adults or children aged 0-7 from all the Spanish CHILDES corpora using CLAN (MacWhinney, 2000). We individually analyzed all 3,196 utterances and classified them according to (i) order of arguments: Exp-V-Theme, Theme-V-Exp, or other, and (ii) sentence type: declarative, Y/N-question, *wh*-question, relative clause. In the case of *wh*-questions, we also coded for extraction site: subject-theme, object-experiencer, other (adjunct, embedded verb argument/adjunct).

Results reveal that children start producing the Exp-V-Theme (OVS) order earlier (first instance found at 2;3), than the Theme-V-Exp (SVO) order (first instance found at 2;7). We also find that both adults and children produce more instances of Exp-V-Theme utterances, i.e., OVS order, than Theme-V-Exp utterances, i.e., SVO order (see Table 2). Importantly, the proportion with which children use the order Exp-V-Theme (95%) as opposed to the order Theme-V-Exp (5%) is significantly different in adults (76% vs. 24% respectively), *Fisher's exact test*, $p < .001$. In other words, children produce significantly *fewer* Theme-V-Exp (SVO) constructions than expected given their input.

Table 2. Corpus study results by age group and relevant word order

	Exp-V-Theme	**Theme-V-Exp**
Adults	76% (256/337)	24% (81/337)
Children	95% (139/147)	5% (8/147)

In order to ensure that this difference between adults and children is not driven by the potentially large number of subject(theme)-extracted *wh*-questions adults ask children (e.g., *¿Qué dibujos te gustan?* 'Which cartoons do you like?'), we excluded all non-declarative sentences from both groups and compared the distribution of the two orders in the two populations again. The difference was still largely significant ($p = .006$). This suggests that the Theme-V-Exp order (SVO) with *gustar* may be challenging for children to acquire.

Our corpus results are thus difficult to reconcile with input-frequency-based accounts. If children were simply producing the surface word order they hear more often in their input, we would expect them to use more SVO (Theme-V-Exp) utterances than OVS (Exp-V-Theme) utterances, as subjects in Spanish are most often preverbal with transitive verbs (Bel 2003, López Meirama 1997, Mayoral-Hernandez 2006). Alternatively, if children simply mimic the surface word order they hear *for each specific verb lexeme* (Tomasello 2003), we would expect them to produce '*gustar*' with the orders SVO and OVS in the same proportion in which they hear them, i.e., approximately 24% and 76%

respectively. However, children *underuse* the SVO word order with '*gustar*'. Our results are thus, so far, more in line with structural intervention accounts, which claim that nothing is intrinsically difficult about moving an argument, so long as it does not cross an intervening DP, as is the case with the order SVO (Theme-V-Exp) with psych verbs like '*gustar*'. In the following experimental study, we test the predictions of featural Relativized Minimality (Rizzi 2004) more carefully.

3. Experimental Study

In this experiment we ask the following questions:

a) Do Spanish-speaking children show a subject > object asymmetry in *wh*-questions with actional (ACT) verbs?
b) Do Spanish-speaking children show an object > subject asymmetry in *wh*-questions with psych (PSY) verbs?
c) Does a mismatch in number features facilitate children's comprehension of *wh*-questions that involve structural intervention?

3.1. Participants

We tested 49 Spanish-speaking children aged 4-6 (M_{age} = 5.4). Ten additional children were tested but excluded because they failed the controls (i.e., they scored less than 6/8 in the actional subject *wh*-question condition), and/or lack of attention throughout the experiment. We also tested 25 Spanish-speaking adults as controls (M_{age} = 38.4). All participants spoke and heard Spanish over 80% of the time. Participants were located in Spain or in Mexico.

3.2. Procedure and Materials

Participants were tested using a picture-matching task administered online through PCIbex (Zehr & Schwarz 2018) while the experimenter observed them through videoconference. Parents and caretakers were asked to assist by selecting the picture the child had pointed at on the screen.

The experimental items featured *d*-linked *wh*-questions with actional and psych verbs that have *superficially* identical structures, as in (8) and (9). *Wh*-questions featured obligatory subject-verb inversion. All arguments were [+human] to ensure children were not using an extrasyntactic strategy to obtain the adult-like response, and [+feminine] in order to (i) keep gender consistently matched, and (ii) make the object marker 'a' more phonetically salient, given that 'a' fuses with the masculine singular article in Spanish (i.e., *a+el 'to the'* = *al 'to-the'*).

(8) a. ¿Qué niña _ le   grita   a   la   maestra? (ACT, Subj)
         which girl 3DAT yell-3SG to   the   teacher
         'Which girl yells at the teacher?'

   b. ¿A   qué   niña le   grita   la   maestra _?   (ACT, Obj)
       to   which girl 3DAT yell-3SG the teacher
       'At which girl does the teacher yell?'

(9) a. ¿Qué niña le   gusta   a   la   maestra _?   (PSY, Subj)
         which girl 3DAT like-3SG   to the   teacher
         'Which girl does the teacher like?'
     b. ¿A   qué   niña _ le   gusta   la   maestra?   (PSY, Obj)
         to   which girl   3DAT like-3SG   the   teacher
         'Which girl likes the teacher?'

There were four training items with transitive verbs. The experiment itself consisted of 32 test items. These were balanced by: (i) VERB TYPE: actional (ACT; *gritar* 'yell', *leer* 'read'), and psych verbs (PSY; *gustar* 'please, like', *molestar* 'annoy, bother'), (ii) EXTRACTION SITE: subject (i.e., agent or theme), object (i.e., goal or experiencer), (iii) NUMBER MATCH: match (both DPs are singular), mismatch (first DP is singular and second is plural).

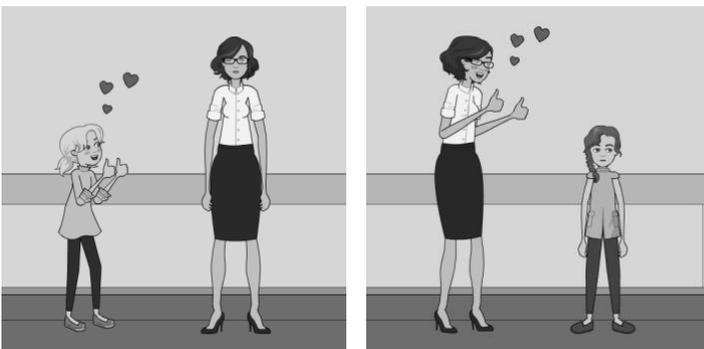**Figure 1. Example trial for the actional verb *gritar* 'yell', match condition**

Figure 2. Example trial for the psych verb *gustar* 'like', match condition

We designed eight different scenarios in order to keep the task entertaining. The images were created by the author using Pixton (Pixton Comics Inc. 2015). Example question and pairs of pictures are given above (Figures 1-2). All questions were prerecorded by the experimenter, but exact repetitions were provided when needed. The order of presentation was pseudorandomized.

3.3. Results

Reponses were analyzed using mixed effects logistic regression models in *R* using the *lme4* package (Bates, Mächler, Bolker & Walker 2015). Score was analyzed as binary dependent variable, fixed effects included VERBTYPE (ACT, PSY), EXTRACTIONSITE (S, O), NUMBERMATCH (M, MM), and all interactions. We also included random intercepts for participant and specific verb, in order to model baseline differences in accuracy of responses. Planned comparisons, if warranted, were done using the *emmeans* package (Lenth et al. 2021).

Results from the adult group are shown in Figure 3. Model comparisons showed that all three main effects significantly contributed to the model fit, VERBTYPE, $\chi^2(4) = 19.31$, $p < .001$, EXTRACTIONSITE, $\chi^2(4) = 16.6$, $p = .002$, NUMBERMATCH, $\chi^2(4) = 32.02$, $p < .001$, as well as the two-way interaction of EXTRACTIONSITE and VERBTYPE, $\chi^2(2) = 11.27$, $p = .003$. In other words, adult performance was significantly affected by our three main variable manipulations. To further probe the interaction between our variables, we conducted post-hoc Tukey tests and found that adults performed significantly worse with psych verbs in subject *wh*-questions ($M = 81.0\%$) than object *wh*-questions ($M = 92.5\%$) ($p = 0.013$). We also found that within psych subject *wh*-questions, they performed significantly worse in matched trials ($M = 72\%$) than mismatched trials ($M = 90\%$) ($p = .001$).
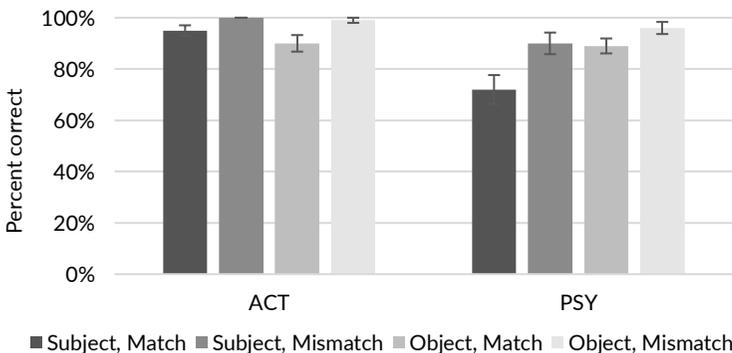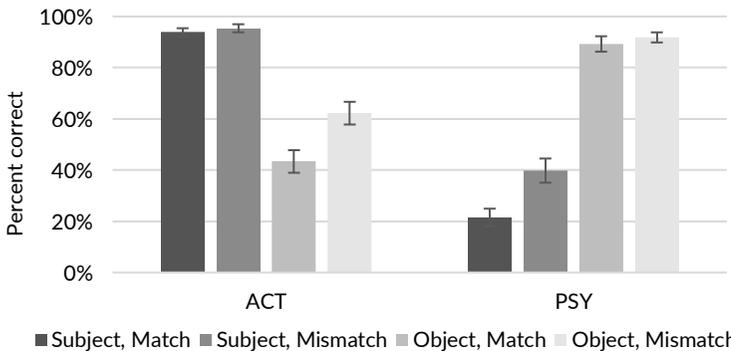

Figure 3. Results from adult group by verb type, extraction site, and number (mis)match

Lastly, even though we found no subject > object asymmetry with actional verbs, we found a difference within the object *wh*-questions, such that adults performed better with mismatched trials (M = 99%) than matched trials (M = 90%) (p = .025). All other within-condition differences were not significant.

Results from the child group are shown in Figure 6.[1] Model comparisons showed that all three main effects significantly contributed to the model fit, VERBTYPE, $\chi^2(4)$ = 555.47, p < .001, EXTRACTIONSITE, $\chi^2(4)$ = 560.45, p < .001, NUMBERMATCH, $\chi^2(4)$ = 34.22, p < .001, as well as the two-way interaction of EXTRACTIONSITE and VERBTYPE, $\chi^2(2)$ = 544.63, p < .001, and marginally, the three-way interaction, $\chi^2(1)$ = 3.268, p = .07. To further probe these interactions, we conducted post-hoc Tukey tests and confirmed that children performed significantly better with subject (M = 94.6%) than object extraction with actional verbs (M = 52.8%) (p < .001) but better with object (M = 90.6%) than subject extraction with psych verbs (M = 30.6%) (p < .001). Notably, experiencer/object-extraction with '*gustar*' posed no problem for children even when both arguments were [+animate], suggesting that children do have an adult-like representation for this idiosyncratic verb.

Importantly, we also found children performed better with actional verbs in the mismatched trials (M = 62.2%) than the matched trials of object *wh*-questions (M = 43.4%) (p < .001), but the difference was not observed in subject *wh*-questions (M_{match} = 93.9%, $M_{mismatch}$ = 95.4%) (p = .497). Conversely, we found children performed better with psych verbs in the mismatched trials (M = 39.8%) than the matched trials of subject *wh*-questions (M = 21.4%) (p < .001), but the difference was not observed in object *wh*-questions (M_{match} = 89.3%, $M_{mismatch}$ = 91.8%) (p = .38).

Figure 4. Results from child group by verb type, extraction site, and number (mis)match

[1] Age was not a significant predictor in our model $\chi^2(1)$ = 2.02, p = .155, so it is not included or discussed in our results.

4. Discussion

We replicated previous findings on *wh*-questions found in other languages, which showed a subject > object asymmetry with actional verbs. This is compatible with input-frequency-based accounts, since subject-, but not object-extracted questions conform to the canonical, most frequent order of the language –SVO. It is also compatible with structural intervention accounts, because object extraction with actional verbs involves crossing the intervening DP subject, which violates children's version of Relativized Minimality (Belletti et al. 2012).

Additionally, we found an object > subject asymmetry with Class III psych verbs like *gustar*. Notably, children perform virtually at ceiling with object-extracted (experiencer) *wh*-questions, as in (9b) even when both experiencer and theme are [+animate]. This strongly supports the idea that by age 4, Spanish-speaking children have an adult-like structure representation of '*gustar'* and can generally understand sentences with this verb despite its unique structure and syntax-semantics mapping. However, they display marked difficulties with '*gustar'* in 'subject'-extracted (theme) *wh*-questions, as in (9a). The object > subject asymmetry with psych verbs supports structure-based accounts based on intervention because 'subject' extraction with psych verbs involves moving the subject theme past an intervener, i.e., the experiencer object (e.g., Belletti & Rizzi, 1988; Cuervo, 1999, 2020). This is the first time the intervention hypothesis has been tested with psych predicates and hence the first clear evidence that the subject > object asymmetry we generally find with A' movement is not an effect of word order (or grammatical function or thematic role) but rather of structural constraints on movement.

Crucially, we also found a feature mismatch advantage with structures that involve intervention – children did better with object extraction with actional verbs and subject extraction with psych verbs when the subject and object mismatched in number features compared to when they matched. This feature match effect, however, was only observed with structures that involved crossing an intervener, and not in subject extraction with actional verbs or object extraction with psych verbs. This is exactly what fRM (Rizzi, 1990, 2004) predicts and is, in principle, unaccounted for under input frequency-based accounts.

Recall that although SVO is the canonical, most frequent word order in Spanish, OVS is the most common word order for psych verbs like '*gustar'*, Input frequency-based accounts may predict children would either tend to overuse the SVO (Exp-V-Theme) order with '*gustar*' compared to adults, or match the proportion with which they hear '*gustar*' with SVO (Theme-V-Exp) and OVS (Exp-V-Theme) in their productions. Results from our corpus study disconfirm these predictions. Children were in fact significantly *less* likely to produce the SVO (Theme-V-Exp) order than adults. Nevertheless, to corroborate that our experimental results could not be attributed to the *specific* frequency with which children hear subject- vs object-extracted *wh*-questions

with '*gustar*', we examined our corpus data (Section 2) in more detail. We were able to confirm that subject (theme) *wh*-questions are in fact much more common in children's input (65% of all *wh*-questions with '*gustar*') than object (experiencer) *wh*-questions (8% of all *wh*-questions with '*gustar*', the rest being adjunct or other types of extraction). Thus, children's poor performance with subject (theme) *wh*-questions cannot be due children never hearing this type of question with *gustar*.

Thus, we can reject input-based explanations at two levels: general word order trends would predict an SVO (Theme-V-Exp) > OVS (Exp-V-Theme) asymmetry, but the opposite is true; and word order based on *wh*-questions with '*gustar*' specifically would predict children would do better with subject (theme) extraction than object (experiencer) extraction, but the opposite is true. Our results, and in particular the effect of morphological feature matches, provide counterevidence for pure input-frequency-based accounts, and are most in line with structural intervention accounts such as fRM (Rizzi, 1990, 2004).

5. Conclusion

In this paper we examined children's comprehension of Spanish *wh*-questions with actional and class III psych verbs of the *gustar*-type. Previous studies have found a subject > object asymmetry with actional verbs, a finding that is consistent with both input frequency accounts and structural accounts. Spanish psych verbs like '*gustar*' involve an experiencer object that is projected higher than the theme subject. Structure-based accounts thus predict an *object* advantage with psych verbs, i.e., a preference for OVS.

Our corpus study showed that both adults and children produce more OVS (Exp-V-Theme) than SVO (Theme-V-Exp) orders with '*gustar*'. Yet children produce significantly fewer instances of SVO (Theme-V-Exp) than expected given their input, an unexpected finding under frequency accounts. To confirm that this difference between children and adults is due to structural intervention (fMR), we conducted an experimental study. With respect to actional verbs, we replicated results from other languages – Spanish-speaking 4-6-year-olds perform better with subject than object extraction with actional verbs. However, children (and adults) perform better with object (experiencer) than subject (theme) extraction with psych verbs like '*gustar*'. A mismatch in number features improves children's performance on intervening structures *only*. This is the first study to examine possible intervention effects with psych verbs and our results provide strong support for intervention theories such as featural Relativized Minimality (Rizzi, 1990, 2004).

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