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On the acquisition of Spanish psych predicates: When intervention makes extraction of a nominative *wh*-phrase harder

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Abstract

Spanish psych verbs like *gustar* ('like'/'please') have a non-agreeing dative experiencer that asymmetrically c-commands the agreeing nominative theme (e.g., Cuervo 2003). Intervention accounts (Friedmann et al. 2009) thus predict children will experience difficulties with constructions that involve movement of the nominative-bearing argument past the dative DP. In this study we evaluate this prediction with a corpus study and an experimental study. Results from the corpus study show that children under the age of 7 underuse the DP$_{NOM}$-V-DP$_{DAT}$ order (Theme-Verb-Experiencer) with *gustar* compared to adults, in line with our predictions. In a picture-matching task we tested 4-6-year-olds on *d*-linked *wh*-questions with actional and psych verbs. Results reveal that while children display the expected NOM > DAT *wh*-phrase extraction asymmetry with actional verbs, they

show a DAT > NOM asymmetry with psych verbs. Moreover, children perform worse when the two arguments match in number features (i.e., SG-SG) compared to when they mismatch (i.e., SG-PL), but crucially, only in *wh*-questions that involve intervention. Our results cannot be fully explained under input-based accounts and are most in line with a structural account such as featural Relativized Minimality (Rizzi 2004).

Keywords: *wh*-questions, psych verbs, intervention, acquisition, Spanish.

1. Introduction

This study investigates Spanish-speaking children's acquisition of *d*-linked *wh*-questions with actional verbs like *gritar* ('yell') (1) and psychological (psych) verbs like *gustar* ('like'/'please') (2), both of which take two arguments – an agreeing nominative DP and a non-agreeing dative DP.

(1) a. ¿Qué niñas le grit-an a la maestra? (Spanish)
which girls DAT.3SG yell-PRS.3PL to the teacher
'Which girls yell at the teacher?'
b. ¿A qué niñas les grit-a la maestra?
To which girls DAT.3PL yell- PRS.3SG the teacher
'At which girls does the teacher yell?'

(2) a. ¿Qué niñas le gust-an a la maestra?
Which girl DAT.3SG like- PRS.3PL to the teacher
'Which girls does the teacher like?'
b. ¿A qué niñas les gust-a la maestra?
To which girls 3DAT.PL like- PRS.3SG the teacher
'Which girls like the teacher?'

Object A'-extraction, exemplified in (1b), has been found to be particularly difficult for young children to comprehend. There are two possible types of explanations for the delay. Input-driven explanations argue that the canonical SVO (DPNOM-V-DPACC/DAT) order is maintained in subject *wh*-questions but disrupted in object *wh*-questions, hence children's difficulties with the latter but not the former. Structure-based explanations, on the other hand, claim that children's difficulties are due to intervention effects, i.e., the dependency between the *wh*-phrase and its base-generated position is hampered by the subject DP, which overlaps in some crucial features with the moved element.

Unlike actional verbs, which exhibit an unmarked DPNOM-V-DPACC/DAT order in Spanish, *gustar*-type verbs have a neutral DPDAT-V-DPNOM order. There exists syntactic evidence that the non-agreeing dative experiencer is projected *higher* than the agreeing nominative theme (Belletti & Rizzi 1988, Cuervo 2003, 2020, Fernández Soriano 1999, Landau 2010, Masullo 1992, Parodi-Lewin 1991). Structural accounts thus predict better performance with dative *wh*-phrase extraction with psych verbs in Spanish, i.e., they should do better with (2b) than (2a).

Despite the extensive literature on the acquisition of A'-constructions in English and other Romance languages, there is little research on these constructions

in child Spanish and the acquisition of psych verbs. The goals of this study are (i) to investigate extraction asymmetries in child Spanish, particularly in constructions that do not involve the often-tested $Agent_{NOM}$-$Theme_{ACC}$ argument combination with actional verbs, (ii) to provide empirical evidence for the idiosyncratic structure of Romance psych verbs, and (iii) to explore the roles of intervention vs. input-frequency effects.

b.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 2016, Bentea, Durrleman & Rizzi 2016, de Vincenzi, Arduino, Ciccarelli & Job 1999, Friedmann, Belletti & Rizzi 2009, Seidl, Hollich & Jusczyk 2003, Yoshinaga 1996), including sluiced *wh*-questions (Mateu, Hyams & Winans 2017, Mateu & Hyams 2021), relative clauses (Adani et al. 2010, Arosio, Guasti & Stucchi 2012, Belletti, Friedmann, Brunato & Rizzi 2012, Costa, Lobo & Silva 2001, Friedmann et al. 2009, Friedmann & Novogrodsky 2004, Mateu & Hyams 2020, Torrens 2017), topicalizations (Friedman & Lavi 2006), and clefts (Aravind, Hackl & Wexler 2017).

For example, Friedmann et al. (2009) tested Hebrew-speaking children aged 3;7-4;10 in a question-picture matching task. The task included pictures with three figures, two of the same type, arranged in an ABA fashion, where the first A was performing an action on B and B was performing the same action on the second A. All verbs were semantically reversible. Given questions such as the ones in (3), children performed at 78% with subject *which*-questions but at 58% with object *which*-questions.

(3) a. Which dog __ is biting the cat? (English)
b. Which dog 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. 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). There was also a higher rate of passivization with ORCs, as has been reported in other languages as well (e.g., Italian, Contemori & Belletti 2010, a.o). 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%), as in (4a) than ORCs (61.88%), as in (4b) (actual sentences from the study).

(4) a. Señala la pantera que está empujando a-l elefante
point the.F panther.F that is pushing to-the.M elephant.M
'Point to the panther that is pushing the elephant.'
b. Señala el caballo que el león está siguiendo
point the.M horse.M that the.M lion.M is chasing
'Point to the horse that the lion is chasing.'

However, it is worth noting that in Torrens' study, only SRCs contained the differential object marker *a* (fused with the masculine article *el* and surfacing as *al* in (4a)) and the gender of the two DPs was not systematically matched or mismatched, creating a potential advantage for SRCs (for reasons discussed below). One of the goals of this study is to provide additional empirical evidence for A'-extraction asymmetries from Spanish, a language that has not been as widely studied as other Romance languages with respect to the purported difficulty with object extraction.

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., Bever 1970, 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 or DP$_{NOM}$-V-DP$_{ACC}$) 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 (e.g., OSV or DP$_{ACC}$-DP$_{NOM}$-V in English), 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; Starke 2001) 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, (5).

(5) X … Z … <Y>

The difference between child and adult grammars stems from the fact that their grammars have different cut-off points in the scale of distinctness, in a system which is otherwise identical, as illustrated in (6) (from Belletti et al. 2012). Whereas adult grammar only rules out configurations that involve *identity* or complete overlap of the relevant morphosyntactic features between the target X and the intervener Z, e.g., +Q in *wh*-islands, children also exhibit marked difficulties with *inclusion* configurations. For example, in the case of ORCs and *d*-linked *wh*-questions, this is due to the NP feature overlapping between the moved element and the intervener. Immature systems are only able to compute configurations in which the extracted A'-object and the embedded subject differ maximally, i.e., in *disjunction* configurations. As a result, they perform considerably better with those dependencies headed by a bare *wh*-element and involving an NP intervener.

(6)

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

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, in addition to a match in NP feature, a match in number between X and Z (i.e., both are SG or PL, as in (7a) from Adani et al. 2010: 2156) have been found to be significantly more difficult than those that mismatch in number (7b). 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 (Adani 2010, Arosio, Guasti & Stucchi 2011, Bentea, Durrleman & Rizzi 2016, Mateu & Hyams 2021) have also been found to ameliorate children's comprehension of object-extracted constructions, but not subject extracted ones.

(7) a. [+R, *NP*, *SG*] [+*NP*, *SG*] <[+R, *NP*, *SG*]>
Il leone che il gatto sta toccando … (Italian)
the lion that the cat is touching
'The lion that the cat is touching…'

b. [+R, *NP*, SG] [+*NP*, PL] <[+R, *NP*, SG]>
Il leone che i coccodrill-i stanno toccando…
the lion that the.PL crocodile-PL are touching
'The lion that the crocodiles are touching…'

It is our objective to provide evidence in favor or against one of these two theoretical approaches – input-based and structure-based accounts. We will do so by examining Spanish-speaking children's comprehension of *wh*-questions with nominative- and dative-bearing arguments with actional verbs and also psych verbs such as *gustar* ('like'/'please'), which most typically exhibit a non-canonical DPDAT-V-DPNOM order in declarative, broad-focus contexts, as we address in the next Section 1.3. We will also manipulate the number feature of the two arguments in order to evaluate the predictions of fRM which specifically predict an effect of number (mis-)match in intervening configurations.

1.3. Spanish psych verbs

Spanish Class III psych predicates (of the *piacere* ('please') 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
(ii) a dative DP experiencer, preceded by *a* and obligatorily doubled with a dative clitic
(iii) a neutral DPDAT-V-DPNOM order (Experiencer-Verb-Theme), although DPNOM-V-DPDAT (Theme-Verb-Experiencer) is also allowed without prosodic breaks (Belletti & Rizzi 1988, Cuervo 2003, 2010, Fábregas, Jimenez-Fernandez & Tubino 2017, Franco & Huidobro 2003, Montrul 1996, Vázquez 2006), as in (8).[1]

(8) a. Las maestras le gust-an a la niña

[1] To facilitate comprehension for non-Spanish speakers, in declaratives, we will translate *gustar* as 'like' when the order is Experiencer-Verb-Theme, and 'please' when the order is Theme-Verb-Experiencer. In *wh*-questions, we will translate all instances as 'like'.

the teachers DAT.3SG like-PRS.3PL to the girl
b. A la niña le gust-an las maestras
to the girl DAT.3SG like-PRS.3PL the teachers
'The teachers please the girl'/'The girl likes the teachers.'

This non-canonical alignment of thematic roles to syntactic positions seems to violate the Uniformity of Theta Assignment Hypothesis (9), as well as Grimshaw's (1990) Thematic Hierarchy (10), since we would expect the most prominent roles to be projected in higher positions in the tree and trigger verbal agreement, like in Class I psych verbs like *odiar* 'hate', exemplified in (11).

(9) Uniformity of Theta Assignment Hypothesis (UTAH, Baker 1988:46)
Identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-structure.

(10) Thematic Hierarchy (TH, Grimshaw 1990)
(Agent (Experiencer (Goal/Source/Location (Theme))))

(11) Las maestras odi-an a la niña
the teachers hate-PRS.3PL to the girl
'The teachers hate the girl.'

UTAH and TH notwithstanding, we have syntactic evidence that the non-agreeing dative experiencer of *gustar* asymmetrically c-commands the agreeing nominative theme (Belletti & Rizzi 1988, Cuervo 2003, 2020, Fernández Soriano 1999, Landau 2010, Masullo 1992, Parodi-Lewin 1991), e.g., the experiencer can bind an anaphor as the theme, as shown in (12a), even when the nominative theme has moved past the dative experiencer to Spec,TP, as in (12b). This contrasts with the sentence in (12c), which contains an actional verb, *describir* 'describe', and where the agreeing nominative subject is never c-commanded by the non-agreeing object, *Daniel*.

(12) a. A Daniel$_i$ le gust-an estos chismes sobre él mismo$_i$
to Daniel DAT.3SG like-PRS.3PL these gossips about him self
más que a nadie.
more than to anyone
'Daniel$_i$ likes this gossip about himself$_i$ more than anyone.'
b. Estos chismes sobre él mismo$_i$ le gust-an a Daniel$_i$
these gossips about him self DAT.3SG like-PRS.3PL to Daniel
más que a nadie.
more than to anyone
'This gossip about himself$_i$ pleases Daniel$_i$ more than anyone.'
c. *Estos chismes sobre él mismo$_i$ describ-en a Daniel$_i$
these gossips about him self describe-PRS.3PL to Daniel
mejor que a nadie.
better than to anyone
'This gossip about himself$_i$ describes Daniel better than anyone.'

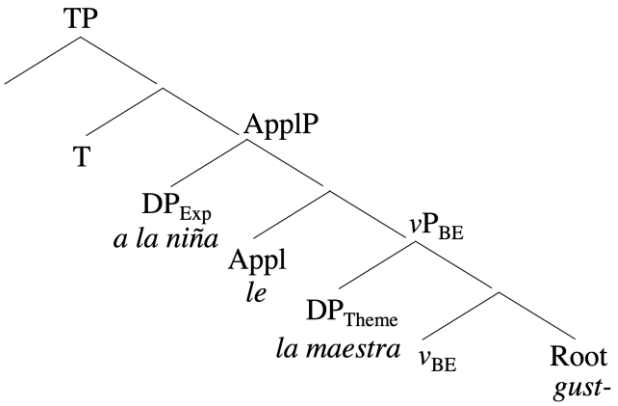
Additional evidence that the dative experiencer c-commands the nominative theme comes from Principle C. In (13) we observe the unmarked DPDAT-V-DPNOM, Experiencer-Verb-Theme order. In (13a) the R-expression, *Daniel* is free when it is the experiencer, but not in (13b), when it is the theme, hence the ungrammaticality of (13b). In (14) we observe the DPNOM-V-DPDAT Theme-Verb-Experiencer order. In (14a), Principle C is violated because the preverbal Theme, which contains the R-expression *Daniel*, reconstructs below the experiencer *él*. On the other hand, (14b) poses no problem for Principle C, because the experiencer, *Daniel*, is never bound by the pronoun embedded in the Theme.

(13) a. A Daniel$_i$ le gust-an los periodistas que hablan de él$_i$.
to Daniel DAT.3SG like-PRS.3PL the journalists that speak of him
'Daniel$_i$ likes journalists that talk about him$_i$.'
b. *A él$_i$ le gust-an los periodistas que hablan de Daniel$_i$.
to him DAT.3SG like-PRS.PL the journalists that speak of Daniel
'He$_i$ likes journalists that talk about Daniel$_i$.'

(14) a. *Los periodistas que hablan de Daniel$_i$ le gust-an a él$_i$
the journalists that speak of Daniel DAT.3SG like-PRS.3PL to him
'Journalists that talk about Daniel$_i$ please him$_i$.'
b. Los periodistas que hablan de él$_i$ le gust-an a Daniel$_i$
the journalists that speak of him DAT.3SG like-PRS.3PL to Daniel
'Journalists that talk about him$_i$ please Daniel$_i$.'

We thus assume that the psych verb *gustar* has the structure represented in (15) (based on Cuervo 2003, 2010, 2020), which aligns with the fact that the neutral, most frequent word order of *gustar* is Experiencer-Verb-Theme (DPDAT-V-DPNOM) (Cuervo 2003, 2010, Fábregas, Jimenez-Fernandez & Tubino 2017, Franco & Huidobro 2003, Montrul 1996, Pericchi 2013, Vázquez 2006).

(15)



1.4. Children's acquisition of Spanish psych verbs

Although there exist numerous studies about the acquisition of *gustar*-type verbs by adult L2 Spanish speakers (e.g., Gascon 1998, Gómez Soler 2014, Kanwit 2009, Mayoral Hernandez 2012, Montrul 1998, Quesada 2008, Toth 2003, White et al. 1998, White, Montrul, Hirakawa & Chen 1999, a.o.) and heritage Spanish speakers

(de Prada Pérez & Pascual y Cabo 2011, Miglio & Miranda Flores 2012, Pascual y Cabo & Gómez Soler 2017, Silva-Corvalán 1994, Toribio & Nye 2006, a.o.), surprisingly, we do not know very much about children's L1 acquisition of this type of verbs. One corpus study and two experimental studies have examined children's comprehension of *gustar* in Spanish. Gómez Soler (2011) examined data from five children aged 1;10-4;11 from the CHILDES database (MacWhinney, 2000). Out of 123 instances of *gustar*, children only produced seven errors. She consequently claims that young children do not have difficulties with psych verbs like *gustar*. However, there is no information about the proportion of utterances produced with the prototypical DPDAT-V-DPNOM order as compared to the DPNOM-V-DPDAT order, and there is no adult data to compare it to. Therefore, this study cannot inform the empirical question we are addressing in this study, namely, whether children exhibit more difficulties with the DPNOM-V-DPDAT order, which is the one that involves A(')-movement past a structural intervener.

In another study, Gómez Soler (2012) tested 3-5-year-olds on children's comprehension of four *gustar*-like verbs (*gustar* 'like', *encantar* 'love', *faltar* 'lack', *dar asco* 'disgust') using a Truth-Value Judgment Task. In the task, the experimenter would say, for example, *La fruta favorita de Mickey es la naranja pero él odia la manzana* 'Mickey's favorite fruits are oranges, but he hates apples', to which the puppet would respond with either an Experiencer-Verb-Theme statement like (16a) or a Verb-Theme-Experiencer like (16b). The child's task was to say whether that was True or False.

(16) a. A Mickey le gust-a la naranja.
to Mickey DAT.3SG like-PRS.3SG the orange
b. Le gust-a la naranja a Mickey.
DAT.3SG like-PRS.3SG the orange to Mickey
'Mickey likes oranges.'

Results from the experiment, which consisted of eight test items, revealed that children performed at approximately the same level with both orders of *gustar* – 78% with the Experiencer-Verb-Theme order and 79% with the Verb-Theme-Experiencer order. The four control items, which consisted of the two mental verbs *querer* 'want' and *intentar* 'try', obtained similar scores (78%). Thus, Gómez Soler concludes that young children comprehend the verb *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 quantifier scope relations. Pictures contained a number of objects displayed in a distributive fashion, where (a) all the actors were performing the action, or (b) all but one were performing the action. They tested children on two questions with the Experiencer-Verb-Theme order, such as (17a) and three questions with the Verb-Theme-Experiencer order, such as (17b).

(17) a. ¿A cada niño le gust-a un globo?
to each child DAT.3SG like-PRS.3SG a balloon
'Does each child like a balloon?'
b. ¿Les gust-a un globo a todos los niños?
DAT.3PL like-PRS.3SG a balloon to all the children

'Do all the children like a balloon?'

The 4-year-olds performed at 72% with the order Experiencer-Verb-Theme and at 62.5% with the Verb-Theme-Experiencer order. By 6 years old, they performed at ceiling (100%) with both orders. However, we cannot draw any conclusions about children's comprehension of *gustar* independently of their comprehension of quantifier scope. Moreover, the children were tested on either one order or the other, but not both. Lastly, both Gómez Soler (2012) and Torrens et al. (2006) had very few items per participant, and crucially, both studies only included sentences with inanimate themes. Children may have used this as a cue to align each DP with the corresponding theta role (i.e., *niño* 'boy' = experiencer, *globo* 'balloon' = 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. In this study we seek to shed light on children's representation of *gustar*-type verbs by using intervention as a diagnostic tool.

1.5. This study

In this study we aim to fill several empirical gaps. Many previous experiments on children's comprehension of A'-movement have examined intervention effects in other Romance languages (*French*: Bentea et al. 2016, Bentea & Durrleman 2017, Durrleman, Bentea & Guasti 2016, *Italian*: Adani et al. 2010, Arosio et al., 2009, Belletti et al. 2012, *Portuguese*: Costa, Lobo & Silva 2001, Costa, Grillo & Lobo, 2012, Friedmann & Costa, 2010, *Romanian*: Bentea 2016, Măniţă 2016), but Spanish acquisition data remain underrepresented (c.f. Torrens 2017, but note methodological flaws highlighted in Section 1.1). 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, DP$_{NOM}$-V-DP$_{ACC/DAT}$). However, as we argued in Section 1.3, the structure of Spanish psych verbs like *gustar* involves a dative experiencer that is projected higher than the nominative theme. Structure-based accounts thus predict a NOM > DAT *wh*-phrase extraction asymmetry with actional verbs but a DAT > NOM asymmetry with psych verbs, as outlined in Table 1.

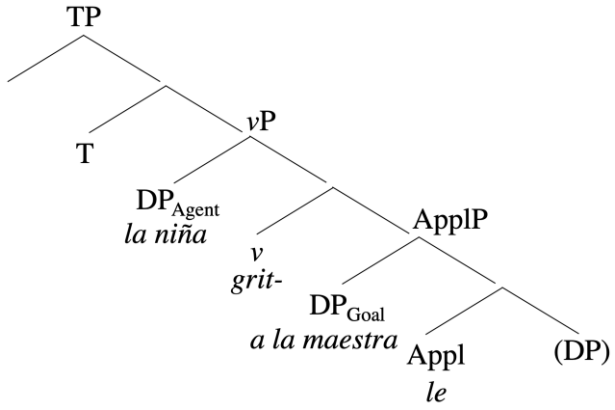
Table 1. Predictions of comprehension by verb type and extracted phrase type according to structure-based accounts

	NOM DP movement (DP$_{NOM}$-V-DP$_{DAT}$)	**DAT DP movement** (DP$_{DAT}$-V-DP$_{NOM}$)
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 nominative agent (in Spec,*v*P) is projected higher than the dative goal (in specifier of low ApplP), as in (18) (adapted from Cuervo, 2003). Moving the goal object past the agent subject incurs an RM violation and should be penalized in child grammars. In the case of psych verbs, the

dative experiencer (in specifier of high ApplP) is projected higher than the nominative theme (in Spec,vP$_{BE}$), as in (15). Extracting the nominative theme past the dative experiencer should be difficult for young children due to intervention.

(18)



Moreover, specific intervention theories, such as *featural Relativized Minimality* (fRM; Rizzi 1990, 2004; Starke 2001), predict that intervention will be mitigated when the intervener has morphosyntactic features distinct from the moved element. In our experimental study (Section 3) we 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, Experiencer-Verb-Theme (DP$_{DAT}$-V-DP$_{NOM}$) or Theme-Verb-Experiencer (DP$_{NOM}$-V-DP$_{DAT}$)? Do children produce each order in the same proportion as their input or do they underuse the DP$_{NOM}$-V-DP$_{DAT}$ order, possibly due to difficulties with nominative DP movement with psych verbs?

In order to answer these questions, we pulled out all the instances of the verb *gustar* produced by adults interacting with children aged 0-7 and children in this age range from all the Spanish CHILDES corpora (MacWhinney 2000) using CLAN. Nineteen different subcorpora contained relevant data for our study. Twelve of them had samples collected in Spain, five in Mexico, one in Argentina, and one in Venezuela.[2] All corpora contained spontaneous and/or semi-spontaneous speech – 16 corpora consisted of transcriptions of free conversations – mostly at home, a few in schools – while three of them also included narrative descriptions of picture books and personal narratives. We obtained 3,196 child and adult utterances from 181 different adults and 156 different children.[3]

[2] As far as we know, no dialectal differences have been reported for these varieties with respect to the target constructions under examination, so we included all available data.

[3] Two of these children were also exposed to some English (from the Montes and LlinasOjea corpora respectively). However, they heard and spoke Spanish most of the time.

We subsequently analyzed all *gustar* sentences and classified them according to (i) order of arguments: Exp-V-Theme, Theme-V-Exp, or other (V-Exp-Theme, V-Exp-Theme, Exp-Theme-V, Theme-Exp-V, V-Theme, Theme- V, V) and (ii) sentence type: declarative, Y/N-question, *wh*-question, relative clause. In the case of *wh*-questions, we also coded for extraction site: nominative theme, dative experiencer, other (adjunct, embedded verb argument/adjunct).

Results reveal that children start producing the Exp-V-Theme (DP$_{DAT}$-V-DP$_{NOM}$) order earlier (first instance found at 2 years and 3 months), (19a), than the Theme-V-Exp (DP$_{NOM}$-V-DPD$_{AT}$) order (first instance found at 2 years and 7 months), (19b).

(19) a. A mí no me gusta la tortilla. (2;3; Koine, elf2_02.cha)
to me not DAT.1SG like the omelette
'I don't like omelette.'

b. Este sí me gusta a mí. (2;7; OreaPine, 020712.cha)
this yes DAT.1SG like to me
'This one pleases me.'

We also find that both adults and children produce more instances of Exp-V-Theme (DP$_{DAT}$-V-DP$_{NOM}$) order than Theme-V-Exp utterances (DP$_{NOM}$-V-DPD$_{AT}$) (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 (DP$_{NOM}$-V-DPD$_{AT}$) constructions than expected given their input.

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

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

In order to ensure that this difference between adults and children is not driven by the potentially large number of 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 (*Fisher's exact test, p* = .006). This suggests that the Theme-V-Exp (DP$_{NOM}$-V-DPD$_{AT}$) order 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, one would expect them to use more DP$_{NOM}$-V-DPD$_{AT}$ (Theme-V-Exp) utterances than DP$_{DAT}$-V-DP$_{NOM}$ (Exp-V-Theme) utterances, as agreeing nominative arguments in Spanish are most often preverbal with transitive verbs (Bel 2003, Bentivoglio 1988, Delbecque 1991, López Meirama 1997, Mayoral-Hernandez 2006, Morales 1989).

Alternatively, if children simply mimic the surface word order they hear *for each specific verb item* (Tomasello 1992, 2000), we would expect them to produce *gustar* with the orders Theme-V-Exp and Exp-V-Theme in the same proportion in which they hear them, i.e., approximately 24% and 76% respectively. However, children *underuse* the Theme-V-Exp 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 DPNOM-V-DPDAT order (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 NOM > DAT *wh*-phrase extraction asymmetry with actional (ACT) verbs, as it has been reported in other languages?
b) Do Spanish-speaking children show a DAT > NOM *wh*-phrase extraction asymmetry with psych (PSY) verbs, as is expected given children's input (with this verb specifically) and the syntactic structure of these verbs?
c) Does a mismatch in number features facilitate children's comprehension of *wh*-questions that involve structural intervention? Only fRM predicts number mismatch to ameliorate intervention effects, but not input-based accounts.

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 nominative *wh*-question condition) (N = 6), and/or lack of attention throughout the experiment (e.g., they would consistently choose the picture on one side of the screen for all trials) (N = 4). 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 either 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 Zoom, Google Meets, or Skype. For the younger child participants, parents and caretakers were asked to assist by selecting the picture the child had pointed at on the screen. Older children were able to click on the image without assistance. Caretakers were instructed not to provide or hint at any answers and to show support and encouragement even if the child made mistakes.

The experimental items featured *d*-linked *wh*-questions with actional and psych verbs that have *superficially* identical structures (Murujosa, Gattei, Shalom & Sevilla 2020), as in (20) and (21). *Wh*-questions featured obligatory subject-verb inversion (Torrego 1984). 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'*).

(20) a. ¿Qué niña _ le grit-a a la maestra? (ACT, NOM)
which girl DAT.3SG yell-PRS.3SG to the teacher
'Which girl yells at the teacher?'
b. ¿A qué niña le grit-a la maestra _? (ACT, DAT)
to which girl DAT.3SG yell-PRS.3SG the teacher
'At which girl does the teacher yell?'

(21) a. ¿Qué niña le gust-a a la maestra _? (PSY, NOM)
which girl DAT.3SG like- PRS.3SG to the teacher
'Which girl does the teacher like?'
b. ¿A qué niña _ le gust-a la maestra? (PSY, DAT)
to which girl DAT.3SG like- PRS.3SG the teacher
'Which girl likes the teacher?'

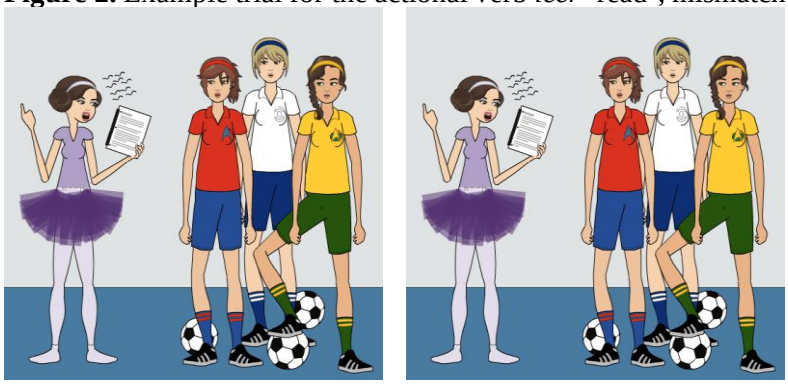
There were four training items which consisted of two actional (*perseguir* 'chase', *saludar* 'wave at') and two perception or mental transitive verbs (*ver* 'see', *admirar* 'admire'), which did not involve any dative clitics. The experiment itself consisted of 32 test items. These were balanced by: (i) VERB TYPE: actional (ACT; *gritar* 'yell', *leer* 'read'), and psych verbs (PSY; *gustar* 'please'/'like', *molestar* 'annoy'/'bother'), (ii) EXTRACTED ELEMENT: nominative (i.e., agent or theme), dative (i.e., goal or experiencer), and (iii) NUMBER MATCH: match (both DPs are singular), mismatch (first DP is singular and second is plural). Therefore, there were four items for each of the eight subconditions, e.g., out of the 32 questions, 16 had an actional verb, and out of those, eight had nominative extraction, and out of those, four had arguments matching in number. Because no theory predicts difficulties with nominative extraction with actional verbs, we used those eight (matched and mismatched) trials as controls. Additionally, since the question types, verbs, and pictures were varied enough, we did not include additional fillers so as to not lengthen the task unnecessarily for children.

We designed eight different scenarios which depicted women in 16 different professions (e.g., teacher, ballet dancer, footballer, farmer, cook, doctor astronaut, explorer, scientist, etc.) in order to keep the task entertaining. The images were created by the author using Pixton (Pixton Comics Inc. 2015). Example questions and pairs of pictures are given below (Figures 1-4). All questions were prerecorded by the experimenter, but exact repetitions were provided when needed. Spanish *wh*-questions are produced with two possible patterns in the nuclear configuration: a falling contour (L* L%) or a rising contour (L* HH%) (Estebas-Villaplana & Prieto 2010, Henriksen 2009, Prieto 2004, Quilis 1993, Sosa 1999). The recordings were all produced in a rising intonation, as they express a nuance of interest and greater speaker involvement in the speech act (Estebas-Villaplana & Prieto 2010) and we wanted to keep the participants as engaged as possible.

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

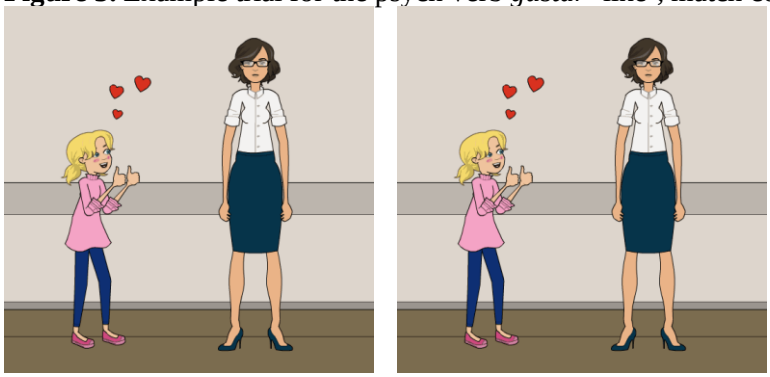
Source: Image created by author using Pixton Comics©

Figure 2. Example trial for the actional verb *leer* 'read', mismatch condition



Source: Image created by author using Pixton Comics©

Figure 3. Example trial for the psych verb *gustar* 'like', match condition



Source: Image created by author using Pixton Comics©

Figure 4. Example trial for the psych verb *molestar* 'bother', mismatch condition

Source: Image created by author using Pixton Comics©

The first time children were presented with a set of images depicting each of the four verbs, the scenario was explained to them to ensure the images were interpreted accurately. Similarly, the first time they saw a new set of professions, they were told which character represented who.

The trials were semi-randomized so that participants never had two trials in a row with the same scenario; more than two trials in a row with the same verb type (ACT, PSY) or nominative or dative *wh*-phrase extraction; or more than three trials in a row with number match or mismatch trials, or left/right image as the correct answer.

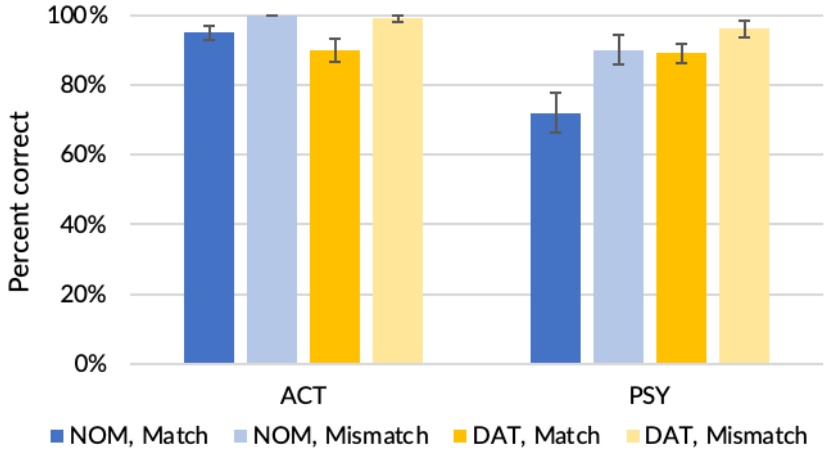
3.3. Results

Reponses were analyzed using mixed effects logistic regression models in *R* (R Core Development Team 2013) using the *lme4* package (Bates, Mächler, Bolker & Walker 2015). Score was analyzed as binary dependent variable, fixed effects included VERBTYPE (ACT, PSY), EXTRACTEDELEMENT (NOM, DAT), 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).

For model convergence reasons, we separated the adult and child data. Results from the adult group are shown in Figure 5. Model comparisons showed that all three main effects significantly contributed to the model fit, VERBTYPE, $\chi^2(4) = 19.31$, $p < .001$, EXTRACTEDELEMENT, $\chi^2(4) = 16.6$, $p = .002$, NUMBERMATCH, $\chi^2(4) = 32.02$, $p < .001$, as well as the two-way interaction of EXTRACTEDELEMENT and VERBTYPE, $\chi^2(2) = 11.27$, $p = .003$. In other words, adult performance was significantly affected by our three main variable manipulations, i.e., whether the verb was actional or psych, whether it was nominative or dative *wh*-phrase extraction, and whether there was a match or mismatch in number features. To further probe the interaction between our variables, we conducted post-hoc Tukey tests and found that even though adults did not show a NOM > DAT asymmetry with actional verbs, they performed significantly worse with psych verbs in nominative (theme) *wh*-questions ($M = 81.0\%$) than dative (experiencer) *wh*-questions ($M = 92.5\%$) ($\beta = 1.137$, $SE = 0.374$, $z = 3.041$, $p = 0.013$). We also found that adults performed significantly worse with nominative (theme) extraction with psych verbs than dative (goal) extraction with actional verbs ($\beta = 1.904$, $SE = 0.682$, $z = 2.791$, $p = .027$).

Additionally, even though we found no NOM > DAT asymmetry with actional verbs, we found a difference within the dative (experiencer) *wh*-questions, such that adults performed better with mismatched trials (M = 99%) than matched trials (M = 90%) (β = -2.459, SE = 1.035, z = -2.375, p = .018). Moreover, within nominative (theme) *wh*-questions with psych verbs, they performed significantly worse in matched trials (M = 72%) than mismatched trials (M = 90%) (β = -1.364, SE = 0.415, z = -3.287, p = .001). All other within-condition differences were not significant.

Figure 5. Results from adult group by verb type, extraction site, and number (mis)match



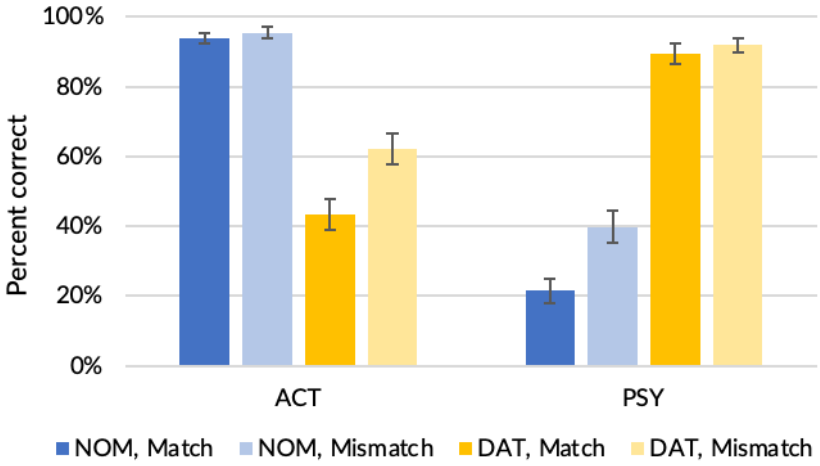
Results from the child group are shown in Figure 6.[4] Model comparisons showed that all three main effects significantly contributed to the model fit, VERBTYPE, $\chi^2(4) = 555.47$, $p < .001$, EXTRACTEDELEMENT, $\chi^2(4) = 560.45$, $p < .001$, NUMBERMATCH, $\chi^2(4) = 34.22$, $p < .001$, as well as the two-way interaction of EXTRACTEDELEMENT and VERBTYPE, $\chi^2(2) = 544.63$, $p < .001$. The three-way interaction did not reach significance but approximated the α-level, $\chi^2(1) = 3.268$, p = .07. To further probe these interactions, we conducted post-hoc Tukey tests and confirmed that children performed significantly better with nominative (agent) (M = 94.6%) than dative (goal) extraction with actional verbs (M = 52.8%) (β = 2.945, SE = 0.256, z = 11.495, $p < .001$) but better with dative (experiencer) (M = 90.6%) than nominative (theme) extraction with psych verbs (M = 30.6%) (β = -3.397, SE = 0.222, z = -15.299, $p < .001$). Like adults, children also performed worse with nominative (theme) extraction with psych verbs than dative (goal) extraction with actional verbs (β = -1.08, SE = 0.163, z = -6.617, $p < .001$).

Importantly, we also found children performed better with actional verbs in the mismatched trials (M = 62.2%) than the matched trials of dative (goal) *wh*-questions (M = 43.4%) (β = -0.853, SE = 0.218, z = -3.914, $p < .001$), but the difference was not observed in nominative (agent) *wh*-questions (M_{match} = 93.9%, $M_{mismatch}$ = 95.4%) (β = -0.310, SE = 0.457, z = -0.679, p = .497). Conversely, we found children performed better with psych verbs in the mismatched trials (M = 39.8%) than the matched trials of nominative (theme) *wh*-questions (M = 21.4%) (β = -0.98, SE = 0.24, z = -4.085, $p < .001$), but the difference was not observed in

[4] 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.

dative (experiencer) *wh*-questions (M_{match} = 89.3%, $M_{mismatch}$ = 91.8%) (β = -0.311, *SE* = 0.354, *z* = -0.878, *p* = .38). That is, dative (experiencer) *wh*-phrase 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.

Figure 6. Results from child group by verb type, extraction site, and number (mis)match



To summarize, both adults and children did well with nominative *wh*-phrase extraction with actional verbs and dative *wh*-phrase extraction with psych verbs, i.e., those that do not involve movement past an intervening argument. However, they had difficulties with dative *wh*-phrase extraction with actional verbs and particularly with nominative *wh*-phrase extraction with psych verbs. This asymmetry is, as expected, particularly exacerbated in children. Lastly, number feature match played a role, but only in intervening structures, i.e., in dative *wh*-questions with actional verbs and nominative *wh*-questions with psych verbs. Specifically, children's (and adults') difficulties with these constructions were alleviated when the nominative and dative elements were mismatched in number features.

These results are most in line with fRM. Recall that this hypothesis predicts that children would have more difficulty with dative *wh*-phrase extraction than nominative *wh*-phrase extraction in actional *wh*-questions. Importantly, it predicts the *reverse* for psych predicates, that children would have more difficulty with nominative *wh*-questions. Lastly, fRM predicts that the more overlap in morphosyntactic features between the moved element and the intervening element, the greater the impediment to establish the dependency successfully. That is exactly what our results show.

4. Discussion

We replicated previous findings on *wh*-questions found in other languages, which showed a NOM > DAT (subject > object) *wh*-phrase extraction asymmetry with actional verbs. This is compatible with input-frequency-based accounts, since $subject_{NOM}$-, but not $object_{DAT}$-extracted questions conform to the canonical, most frequent order of the language –$S_{NOM}VO_{ACC/DAT}$. It is also compatible with structural

intervention accounts, because (dative) 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 interesting DAT > NOM *wh*-phrase extraction asymmetry with Class III psych verbs like *gustar*. Notably, children perform virtually at ceiling with dative (experiencer) *wh*-questions, as in (21b), repeated below as (22b), 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 nominative (theme) *wh*-questions, as in (21a), repeated below as (22a).[5]

(22) a. ¿Qué niña le gust-a a la maestra _? (PSY, NOM)
which girl DAT.3SG like- PRS.3SG to the teacher
'Which girl does the teacher like?'

b. ¿A qué niña _ le gust-a la maestra? (PSY, DAT)
to which girl DAT.3SG like- PRS.3SG the teacher
'Which girl likes the teacher?'

The DAT > NOM *wh*-phrase extraction asymmetry with psych verbs supports structure-based accounts based on intervention because nominative *wh*-questions with psych verbs involve moving the nominative (theme) *wh*-phrase past an intervener, i.e., the experiencer DP (e.g., Belletti & Rizzi, 1988; Cuervo, 1999, 2003, 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 dative *wh*-phrase extraction with actional verbs and nominative *wh*-phrase extraction with psych verbs when the two verb arguments 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 nominative (agent) *wh*-phrase extraction with actional verbs or dative (experiencer) *wh*-phrase extraction with psych verbs. This is exactly what *featural Relativized Minimality* (fRM, Rizzi 1990, 2004; Starke 2001) predicts and is, in principle, unaccounted for under input frequency-based accounts.

Recall that although DPNOM-V-DPACC/DAT is the canonical, most frequent word order in Spanish, DPDAT-V-DPNOM is the most common word order for psych verbs like *gustar*. Input frequency-based accounts may predict children would either tend to overuse the DPNOM-V-DPDAT (Exp-V-Theme) order with *gustar* compared

[5] It is worth noting that both adults and children exhibited more difficulties with nominative *wh*-phrase extraction with psych verbs than dative *wh*-phrase extraction with actional verbs. This unpredicted but not surprising result may be explained by the cumulative complexity of moving past an intervener *and* projecting a structure that has a highly marked syntax-to-semantics mapping (i.e., a theme that is projected lower in the structure than the experiencer but nevertheless gets nominative case and verbal agreement). We thank an anonymous reviewer for raising this question.

to adults, or match the proportion with which they hear *gustar* with DPNOM-V-DPDAT (Theme-V-Exp) and DPDAT-V-DPNOM (Exp-V-Theme) in their productions. Results from our corpus study disconfirm these predictions. Children were in fact significantly *less* likely to produce the DPNOM-V-DPDAT (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 nominative (theme) vs dative (experiencer) *wh*-questions with *gustar* or the frequency with which they hear matched and mismatched DP arguments with this verb, we examined our corpus data (Section 2) in more detail. We were able to confirm that nominative (theme) *wh*-questions are in fact much more common in children's input (65% of all *wh*-questions with *gustar*) than dative (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 nominative (theme) *wh*-questions cannot be due to children never hearing this type of question with *gustar*. Similarly, we examined the number features of the theme and experiencer when these were 3rd person. Matched features, i.e., [SG, SG] or [PL, PL], are much more common in children's input (66%) with this particular verb than mismatched features, i.e., [SG, PL] or [PL, SG] (33%).

Thus, we can reject input-based explanations at several levels: general word order trends would predict a DPNOM-V-DPDAT (Theme-V-Exp) > DPDAT-V-DPNOM (Exp-V-Theme) asymmetry, but the opposite is true; word order based on *wh*-questions with *gustar* specifically would predict children would do better with nominative (theme) extraction than dative (experiencer) extraction, but the opposite is true. Lastly, matched number features would be predicted to be easier than mismatched features, but again, the opposite is true. Our results provide counterevidence for pure input-frequency-based accounts, and are most in line with structural intervention accounts such as fRM (Rizzi, 1990, 2004).

5. Conclusions

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 $\text{Subject}_{\text{NOM}}$ > $\text{Object}_{\text{ACC/DAT}}$ asymmetry with actional verbs, a finding that is consistent with both input frequency accounts and structural accounts. Subject *wh*-questions maintain the canonical word order of the target language, and they do not involve movement past an intervening argument, while object *wh*-questions deviate from the unmarked word order and they involve movement past an intervener. Spanish psych verbs like *gustar* involve a non-agreeing dative experiencer that is projected higher than the agreeing nominative theme. Structure-based accounts thus predict a dative advantage with psych verbs, i.e., a preference for DPDAT-V-DPNOM.

In order to evaluate the predictions of input frequency-based and structure-based accounts we conducted a corpus study and an experimental study. Our corpus study showed that both adults and children produce more DPDAT-V-DPNOM (Exp-V-Theme) than DPNOM-V-DPDAT (Theme-V-Exp) orders with *gustar*. Yet children produce significantly fewer instances of DPNOM-V-DPDAT (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 (fRM), 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 nominative (agent) than dative (goal) *wh*-questions with actional verbs. However, children (and adults) perform better with dative (experiencer) than nominative (theme) *wh*-questions with psych verbs like *gustar*. A mismatch in number features improves children's performance on intervening structures *only*, i.e., dative *wh*-questions with actional verbs and nominative *wh*-questions with psych verbs. 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), which effectively predict a nominative *wh*-phrase extraction advantage with actional verbs, but a dative advantage with psych verbs.

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