On the Learnability of Implicit Arguments
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Abstract: It has been argued that the experiencer argument of *seem* is always syntactically projected, and should thus induce an intervention effect even when not overtly produced. The results of our experimental study provide evidence for this claim–English-speaking children perform poorly on raising with *seem*, whether the intervening experiencer argument is overt or implicit. Conversely, Spanish-speaking children show adult-like performance with the raising semi-modal verb *parecer* 'seem', which does not take an experiencer argument. This outcome raises questions regarding learnability, i.e. English-speaking children must know to project an implicit experiencer with *seem*, while Spanish-speaking children must not do so with the functional verb *parecer*. In this paper we provide a learning path that resolves this learning challenge.

1. Introduction

Until the age of six, English-speaking children interpret Subject-to-Subject Raising (StSR) structures with *seem*-type predicates (1) in a non-adult-like manner (Choe 2012; Hirsch 2011; Hirsch, Orfitelli & Wexler 2007; Orfitelli 2012, *inter alia*).

(1)   John$_i$ seems (to Mary) t_i to be nice.

One prominent account is that the experiencer argument induces an intervention effect, either for grammatical (e.g. Hyams & Snyder 2005; Orfitelli 2012; Snyder & Hyams 2015) or processing reasons (e.g. Choe 2012; Choe & Deen 2016). In this paper we compare children's performance on StSR in English and Spanish. We demonstrate children also show difficulties with raising when the intervening experiencer is *not* pronounced, and we provide a learning path that addresses the learnability problem presented by implicit arguments in StSR.

1.1. *Intervention accounts*

One account of children's difficulty with raising is Hyams and Snyder's (2005, 2015) Universal Freezing Hypothesis which proposes that young children do not have access to the smuggling operation that adults use to circumvent the intervening experiencer argument, illustrated in (2) (Collins 2005a). Thus, for young children A-movement in raising (and passives) is reliably blocked due to minimality constraints.

(2)
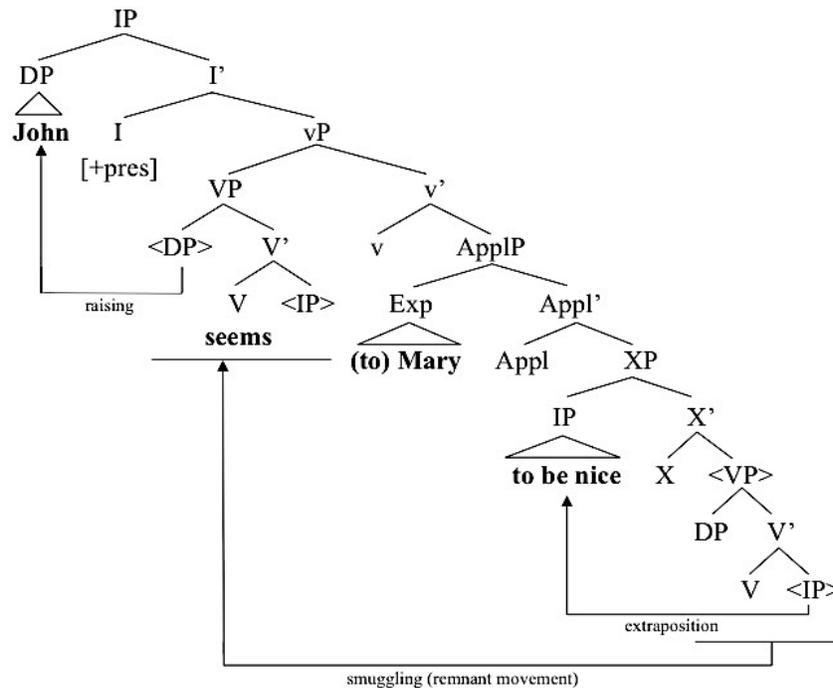
Similarly, Orfitelli (2012), abstracting away from specifics, argues that children cannot A-move across a structurally intervening argument (Argument Intervention Hypothesis (AIH)). Importantly, both these accounts hypothesize that the experiencer in StSR *seem* is always syntactically projected (see Landau 2010), even when not overtly produced, similar to the covert external argument in passives (see Baker, Johnson & Roberts 1989, Collins 2005b; Gehrke & Grillo 2008, *inter alia*). Therefore, children are expected to perform poorly with StSR whether the intervener is explicit or implicit.[1]

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[1] This is in contrast to processing-based accounts, for example, Choe (2012) which predicts intervention effects only with overt intervening arguments.

The diagnostics of implicit argumenthood for the passive *by*-phrase are mostly agent-oriented and hence not available for the experiencer of StSR sentences. However, examples from binding (3a), 'speaker/experiencer'-oriented modifiers (3b-c), and instrumental phrases (3d) suggest the presence of an implicit experiencer argument. In (3a) the implicit experiencer must be disjoint from *Mary*. In (3b) it is the implicit experiencer who is convinced that James loved the woman. However, when *seem*, the licenser of the implicit experiencer, is removed, as in (3c), the sentence becomes severely degraded. Similarly, in (3d), the diamond is perceived to be of good quality by the implicit experiencer.

(3) a. John seems {__/to her} to like Mary.
    [implicit/explicit experiencer of *seem* ≠ Mary]
 b. James killed the woman he so convincingly seemed to love.
 c ??James killed the woman he so convincingly loved.
 d. This diamond seems to be of high quality, at least with the naked eye.

1.2. *Acquisition studies*

Previous experimental results on children's performance on StSR *seem* with a covert (or fronted) experiencer are inconsistent. Hirsch et al. (2007), Hirsch (2011), and Orfitelli (2012) found that children do poorly with StSR *seem* without an overt experiencer. Becker (2006), on the other hand, found that children were able to understand *seem* sentences when the experiencer was implicit, but failed at raising past an overt experiencer. Similarly, Choe (2012) found that children had difficulty comprehending StSR sentences with an intervening experiencer, but the difficulty disappeared when the experiencer was fronted.

In our study, we tested the intervention hypothesis in two ways: (1) by giving the same group of English-speaking children both explicit and implicit experiencer conditions, and (2) by investigating the development of raising in Spanish, where the (semi-)modal verb *parecer* 'seem' does not select for an experiencer.

1.3. *Spanish* parecer

The Spanish verb *parecer* represents an interesting test case of the intervention hypothesis because of its dual status as both a lexical and functional verb (see Ausín & Depiante, 2000; Ausín, 2001; Fernández Leborans, 1999; Torrego, 1996, 1998, 2002):[2] F-*parecer* (also known as 'bare' *parecer*) is a functional verb (of epistemic modality) with no argument structure (i.e. it does not select an experiencer). This verb

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[2] See Cinque (2004) and Haegeman (2006) for a similar analysis of Italian *sembrare.*

occupies a relatively high position on the functional hierarchy (see Cinque 2004). By contrast, L-*parecer* (also known as 'opinion' *parecer*) is a lexical verb with a meaning closer to 'think/consider', which does select an experiencer and in this respect is like English *seem*.

Several sorts of evidence exist for the dual status of *parecer*:[3]

a. Both verbs allow for CP complements (4); however, F-*parecer* can select non-finite verbal complements (5a) while L-*parecer* only selects (individual-level) AP (or DP) small clauses (5b):

(4) a. *Parece que Juan tiene hambre.* (*F-parecer*)
seems that John has hunger
'It seems that John is hungry.'

b. *Me parece que Juan tiene hambre. (L-parecer)*
1DAT seems that John has hunger
'I think that John is hungry.'

(5) a. *Este chico parece* {(*ser*) *listo* / *comer mucho*}.
this boy seems be smart eat much
'This boy seems {(to be) smart / to eat a lot}.'

b. *Este chico me parece* {(*ser) *listo* / *comer mucho}.
this boy 1DAT seems be smart eat much
'I think this boy is smart / eats a lot}.'

b. Both F-*parecer* and L-*parecer* can appear in the present and imperfect, but F-*parecer* cannot occur in the preterit, perfect, or progressive (6):

(6) a. *Juan* {*parece* / *parecía* /*pareció /
John seem-PRS.3SG seem-IMPF.3SG seem-PRET.3SG
*ha parecido *está pareciendo} (*ser*) *listo.*
has seemed is seeming be smart
'John seems/ used to seem/ seemed/ has seemed/ is seeming (to be) smart.'

b. *Juan me* { *parece* / *parecía* / *pareció* /
John 1DAT seem-PRS.3SG seem-IMPF.3SG seem-PRET.3SG
ha parecido / *está pareciendo*} *listo.*
has seemed is seeming smart
'I think / used to think / thought/ have thought / am thinking that John is smart.'

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[3] For reasons of space we provide only a few of these arguments. For a more in-depth discussion see Mateu (2016).

    c.   Consistent with a modal analysis of (F-*parecer*, it allows clitic-climbing (7) (Torrego 2002), and "modal stacking" (8a), as is possible with other modals (8b), reinforcing the idea that F-*parecer* occupies a relatively high position in Cinque's (2004) hierarchy.

    (7) a.   *Juan parece haberlo resuelto.*
             John seems have-it solved
             'John seems to have solved it.'

         b.   *Juan* lo *parece haber resuelto.*
             John it seems have solved
             'John seems to have solved it.'

    (8) a.   *El candidato parece poder hablar zapoteco.*
             The candidate seems may speak Zapotec
             'The candidate seems to be able to speak Zapotec.'

         b.   *El candidato debe poder hablar zapoteco.*
             The candidate must may speak Zapotec
             'The candidate must be able to speak Zapotec.'

In sum, evidence from complement selection, tense/aspect/mood selection, among other diagnostics, shows that F-*parecer* is a modal-like verb, which does not select an experiencer (clitic or clitic + full DP) – a property of modals in general, while L-*parecer* is closer to a lexical verb which selects an experiencer argument. Crucially, the appearance of the dative clitic experiencer forces this second 'think' reading, and the absence thereof forces the F-*parecer* analysis.

1.4. Goals of this paper

Our experimental goal was to use the notion of intervention to determine whether the experiencer of *seem* is always syntactically represented, even when not pronounced. In order to address this question we compared English-speaking children's performance on StSR *seem* with a covert and overt experiencer and Spanish-speaking children's performance on F-*parecer* (no experiencer) and L-*parecer* (overt experiencer).[4] If the hypothesis we are entertaining is correct, we should find English-speaking children perform poorly with StSR *seem* both when the experiencer is overt and when it is covert. However, Spanish-speaking children should only perform poorly with StSR L-*parecer*, but not F-*parecer*, because in the latter case there is no (overt or covert) intervening argument to by-pass. In Section 2 we present our experimental study.

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[4] See Mateu (2016) for an extended version of the experimental part of this study.

To anticipate our results, that is exactly what we find –English-speaking children perform poorly with StSR *seem* without an overt experiencer, and Spanish-speaking children do well on the superficially similar StSR F-*parecer* (no experiencer). Our results then raise the question of how children learn implicit argument structure, especially in light of cross-linguistic and lexical differences. The learnability issue is addressed in Section 3.

2. Experimental Study: English *seem* and Spanish *parecer*

2.1. *Subjects*

A total of 30 monolingual English-speaking children (4;2-6;7) and 36 monolingual Spanish-speaking children (4;5-6;11) participated in this study. Children were grouped into three age categories: four-, five-, and six-year olds. The English study was conducted primarily in a childcare center in Los Angeles and in an elementary school in Ventura County and the Spanish experiments were conducted in a preschool and a primary education center in Granada, Spain. Ten native English-speaking adults and 12 native Spanish-speaking adults were tested.

2.2. *Material and Procedure*

We used a Truth-Value Judgment task (TVJT; Crain & McKee 1985), in which the child observes a story, then a puppet comments on it, and the child indicates whether the puppet commented truthfully or not. Two training trials preceded each test session to ensure the child understood the task and would correct the puppet when the comment was inappropriate. An example set of pictures is shown on Figure 1.[5]
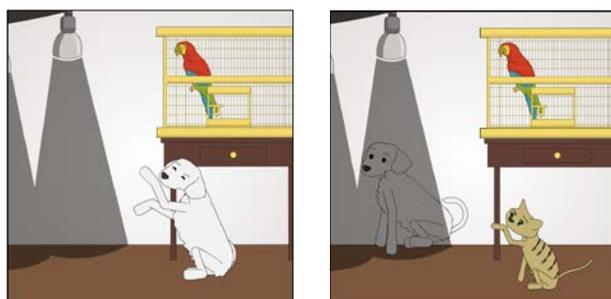
Figure 1. Experiment sample pictures.

[5] The stories were similar to those employed in Hirsch et al. (2007), Becker (2006), and Orfitelli (2012). However, in our experiments all stories involved individual-level predicates in order to match the Spanish stimuli for L-*parecer*, which selects only individual level predicates.

Six unique test scenarios were used to keep children engaged in the task. Following the story, the puppet uttered one of the sentence types in Tables 3.

Table 3. Subject-to-subject raising test items for the English and Spanish experiments[6]

Condition	True Test Items	False Test Items
English		
Raised *seem*, covert exp.[7]	The dog definitely seems to be grey.	The dog definitely seems to be white.
Raised *seem*, overt exp.	The dog seems *to the cat* to be grey.	The dog seems to the cat to be white.
Spanish		
Raised F-*parecer* (no exp., +vP)	*El perro definitivamente parece ser gris.* 'The dog definitely seems to be grey.'	*El perro definitivamente parece ser blanco.* 'The dog definitely seems to be white.'
Raised F-*parecer* (no exp., +AP)	*El perro definitivamente parece gris.* 'The dog definitely seems grey.'	*El perro definitivamente parece blanco.* 'The dog definitely seems white.'
Raised L-*parecer* (exp., +AP)	*El perro* le *parece* al gato *gris.* 'The cat thinks the dog is grey.'	*El perro le parece al gato blanco.* 'The cat thinks the dog is white.'

Crucially, the inclusion in the Spanish study of StSR F-*parecer* allowed us to determine if children could perform well with raising when there is no (overt or covert) experiencer. This is in contrast to English, where the experiencer is syntactically present but not overtly expressed. Finally, we included a second 'F-*parecer* followed by an AP' condition, because L-*parecer* only allows for small clause APs. This would ensure that any behavioral difference between children's performance on the

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[6] In addition, we included copula (e.g. *The dog is definitely white*) and unraised (e.g. *It seems that the dog is white*) control sentences. The unraised condition ensured that children understood the lexical properties of the verb *seem/parecer*. Their performance on the raised conditions must therefore be considered separate from this consideration. Children scoring less than 5/6 items correct on either the copula or unraised conditions were excluded from the study.

[7] Following Hirsch et al (2007) we included d*efinitely/definitivamente* in the copula to disambiguate between a stage- versus individual-level predicate reading of the copula, i.e. in order to rule out the interpretation in which adults would accept that the dog *is* grey *when* he stands under the light. We added the modifier on the 'raising with a covert experiencer' condition to match the copula condition.

F-*parecer* and L-*parecer* conditions was exclusively due to the presence of the intervening experiencer and not related to the difference of the complement (i.e. presence/absence of verb *be*).

2.2. *Results*

The English-speaking subjects' performance on the four different conditions is shown in Figure 1. As expected, across all age groups children did well with the 'unraised *seem'* trials (M = 5.63/6), but performed poorly in the 'raised *seem* with an overt experiencer' condition (M = 3.37/6). Importantly, children also performed rather poorly in the 'raised with a *covert* experiencer' condition (M = 3.17/6). In fact, they performed no better in this condition than in the overt experiencer condition (Wilcoxon signed-rank, Z = -.8, p = .42.). This result shows that children do in fact have difficulties with movement over arguments even when they are not overtly expressed. This replicates the findings in Hirsch et al. (2007), Hirsch (2011), and Orfitelli (2012), and contradicts those of Becker (2006) and Chloe (2012).
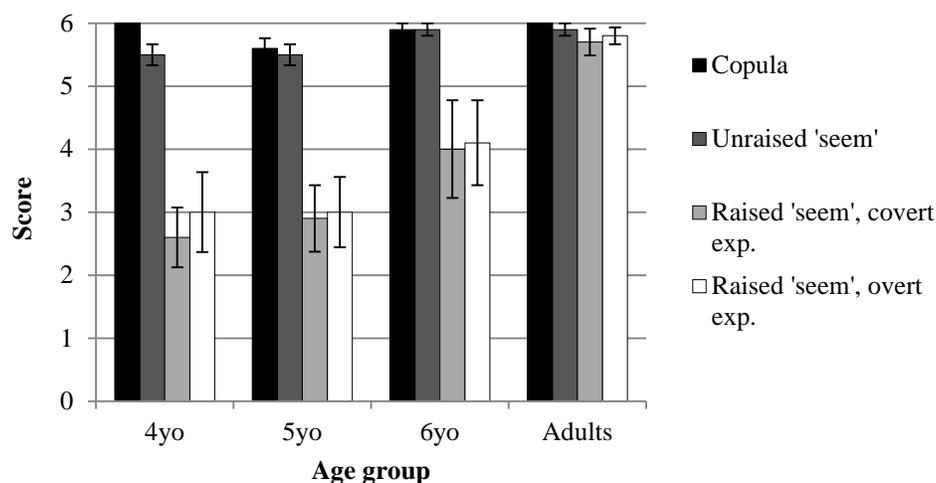

Figure 1. English Subject-to-Subject Raising study results by age group and condition.

In stark contrast to the English-speaking children, Spanish-speaking children did as well in the 'raised F-*parecer*' condition (M = 5.5/6) as in the unraised one (M = 5.58/6) (Wilcoxon signed-rank, Z = -.456, p = .648). On the other hand, as predicted by the intervention hypothesis, children did worse with 'raised L-*parecer*' (M = 4.5) (experiencer) as compared to F-*parecer* (no experiencer, AP) M=5.31/6) (Wilcoxon signed-rank, Z = -2.726, p = .006). The Spanish-speaking subjects' performance on the five different conditions is shown in Figure 2.
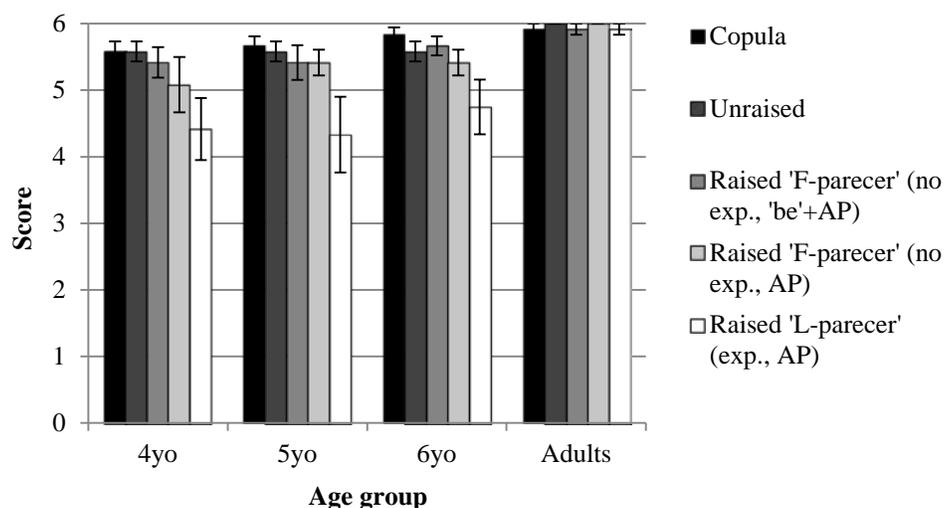
Figure 2. Spanish Subject-to-Subject Raising study results by age group and condition.

Summarizing, in marked contrast to English-speaking children, who perform poorly with raised *seem*, e.g. 'The dog seems to be grey' up till the age of six, Spanish-speaking children succeed on superficially analogous sentences with F-*parecer*, e.g. 'El perro parece ser gris' by age four. This asymmetry strongly suggests that the covert experiencer argument of *seem* is always syntactically represented in English, inducing intervention effects, as suggested by some grammar-based intervention accounts (Orfitelli 2012; Snyder & Hyams 2015). Moreover, these results lend support to the theoretical literature that claims F-*parecer* and L-*parecer* do have different argument structures (Ausín & Depiante, 2000; Ausín, 2001; Fernández Leborans, 1999; Torrego, 1996, 1998, 2002).

3. The learnability problems

The results from our experimental study raise some important questions regarding learnability. Young English-speaking children recognize the presence of an implicit argument in *seem* sentences, and show intervention effects parallel to those seen with an overt experiencer. On the other hand, Spanish-speaking children know that in Spanish 'what you see is what you get': no implicit argument is projected with F-*parecer*, and children do well in this condition, in contrast to L-*parecer* which takes an overt experiencer. How do children know to project an implicit argument in English but not Spanish? Additionally, how do Spanish-speaking children know that there are two (homophonous) *parecer* verbs, one that selects an experiencer and one that does not? And do they know that F-*parecer* is a functional (modal-like) verb?

In what follows we suggest a route by which children can acquire this knowledge through general principles and input.

3.1. *How do children know when to project an implicit experiencer?*

As a point of departure, we propose the learning principle defined in (12):

(12) Project Implicit Experiencer (PIA): An experiencer argument is syntactically projected even when not overtly expressed.

This principle is consistent with UTAH (Baker 1997) (see also Baker et al. 1989, Collins 2005b; Gehrke & Grillo 2008 for similar assumptions regarding the external argument of passives) and will account for the finding in our study (and others) that English-speaking children have difficulty with raising, whether or not the experiencer is overtly expressed. Given the cross-linguistic difference with respect to whether a raising verb selects an experiencer argument the child cannot simply project this argument based on lexical meaning, i.e. "seem" requires someone to experience the seeming. Hence, there must be evidence in the input—in the form of overt experiencers—to inform them of the argument structure –English-speaking children must hear *seem* used with an overt experiencer and similarly, Spanish-speaking children should hear L-*parecer* (but not F-*parecer*) with an overt (clitic [+DP]) experiencer.

We conducted a CHILDES (MacWhinney, 2000) corpus study to verify that such sentences are in the input to children and that children produce them. We extracted all utterances containing the verb *seem* and (F-/L-) *parecer* in all the English and Spanish corpora (as of July 2016). We did this for both adults and children (younger than 6;11.29). As shown by the results in the Tables 5 (English) and 6 (Spanish), children are exposed to instances of *seem* and L-*parecer* with an overt experiencer.[8]

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[8] One striking difference between the two groups concerns the frequency with which children hear overt experiencers, i.e. English-speaking adults produce *seem* with an overt experiencer much less frequently than Spanish-speaking adults use L-*parecer* (with a dative clitic or dative clitic + DP experiencer). This difference may explain the results (see Figures 1 and 2) showing that Spanish-speaking children do better with L-*parecer* than English-speaking children do with *seem*

Table 5. Instances of *seem* produced by adults and children (CHILDES)

Sentence type	Adults	Children
seem, **covert exp.**	**95.8% (1213)**	**94.1% (64)**
Unraised *seem*	7.5% (91)	23.4% (15)
Raised *seem*	92.5% (1122)	76.6% (49)
seem, **overt exp.**	**4.2% (53)**	**5.9% (4)**
Unraised *seem*	41.5% (22)	50% (2)
Raised *seem*	58.5% (31)	50% (2)

Table 6. Instances of *parecer* produced by adults and children (CHILDES)

Sentence type	Adults	Children
F-*parecer,* no exp.	**40.1% (460)**	**65.9% (143)**
Unraised F-*parecer*	18.9% (87)	22.4% (32)
Raised F-*parecer*	81.1% (373)	77.6% (111)
L-*parecer,* exp.	**59.9% (686)**	**34.1% (74)**
Unraised L-*parecer*	63.7% (437)	75.7% (56)
Raised L-*parecer*	36.3% (249)	24.3% (18)

Adult examples are provided in (13-14), and child examples in (15-16).

(13) a. This seems to me to be a very funny barn.
(Manchester, aran26a.cha, line 741)

b. It seems to me to be rather continental.
(Manchester, aran34b.cha, line 823)

(14) a. *Pero a ellos les   parece feo*.
But   to them 3PL.DAT seem   ugly
'But they think it's ugly'.   (Koine, elf3_05.cha, line 433)

b. *Ese   pueblo no te   parece bonito?*
That town   not 2SG.DAT seem   beautiful
'Don't you think that town is beautiful?'
(FernAguado, manoct98n.cha, line 349)

(15) a. It seemed to me there was something.(4;0)
(Gleason, wanda.cha, line 1722)

b. That doesn't seem Chinese to me.   (5;2)
(Gathercole, 06.cha, line 1587)

(16) a. *A mí me   parece un toro*.   (3;5)
to me 1SG.DAT seem   a   bull
'I think that's a bull'.   (Koine, vit4_06.cha, line 448)

> b. *A mí me   parece que este papá se va a montar.*(4;0)
>   to me 1SG.DAT seem   that this dad   SE go to ride
>   'I think this dad is going to ride it.'
>   (FernAguado, manoct98n.cha, line 349)

Importantly, and assuming PIA, both English- and Spanish-speaking children will project an experiencer argument based on positive evidence from their input and they will infer that when it is not overtly produced, it is nevertheless syntactically projected (e.g. as a bare free variable or as *pro*, see Landau 2010).

There is, however, an important difference between English *seem* and Spanish L-*parecer*. Spanish psych verbs (including *parecer*) require a dative clitic to license a DP experiencer, whether the experiencer is overt or covert, so called 'clitic doubling', as illustrated in (17):

> (17)   *El   chico* (*le*)   *parece* { *a su madre / pro listo* }.
>   The boy   3SG.DAT seems   to his mother   smart
>   'The boy's mother thinks he is smart'.

It is the overt DP or ec (*pro*) that receives the experiencer theta-role and not the clitic, which is not an argument but a functional head of some sort – head of ClP (e.g. Sportiche, 1996). We must assume therefore that what blocks raising for Spanish-speaking children in L-*parecer* structures is not the dative clitic but the DP experiencer argument (or its covert counterpart *pro*[9]), just as in English. Hence, the difference between English- and Spanish-speaking children (wherein the former fail with both an overt and implicit experiencer; the latter only with an overt experiencer) is more apparent than real.

The observation that clitic doubling is required with Spanish psych verbs provides an avenue for addressing a second learnability question:

3.2. *How does the Spanish-speaking child know that there is a "second" parecer?*

If the experiencer argument must be licensed by a dative clitic, then the child can take the absence of such a clitic as evidence that the verb does not take an experiencer argument, and hence that there must be two different verbs *parecer*, with two different argument structures.

Finally, we ask:

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[9] Note that children's performance on L-*parecer* with a clitic experiencer and no overt DP remains to be tested. However, our prediction is that children will perform poorly in this case as well.

3.2. How does the Spanish-speaking child learn that the second parecer*, F-*parecer*, is a functional (modal-like) verb?*

We assume that the two *parecer* verbs represent a "lexical split" in the sense of Roberts and Roussou (2003), i.e. *parecer* is inserted either in V (L-*parecer*) or a relatively high position in the functional hierarchy (F-*parecer*) (e.g. Cinque 2004). In order to be able to determine the "second" *parecer* is a (high) functional verb, the learner could in principle appeal to positive evidence in the input. As discussed above (Section 1.3.), F-*parecer*, like other Spanish modals, allows for clitic climbing and modal stacking. However, we did not find a single example of either construction in our CHILDES searches. We will therefore appeal to economy principles as the force driving the child to assume a functional analysis of F-*parecer*: In cases of lexical/functional ambiguity, the learner assumes the simplest representation (see Roberts & Roussou 2003; Clark & Roberts 1993). An analysis of F-*parecer* as a modal-like verb allows direct merger into (some) FP, as opposed to merging into VP (as for L-*parecer*) and then moving to the higher FP, a less economical derivation. This is consistent with other evidence that children prefer Merge over Move (or copy and displacement) operations (see Jakubowicz 2004, 2011; Zuckerman et al. 2001).

4. Summary and conclusions

Our experimental results suggest that children do not have difficulties with raising *per se*, as suggested by their adult-like performance in the raising F-*parecer* condition (no experiencer). The difficulty, we believe, lies in raising *across an intervening argument*. Crucially, intervention effects will arise both with overt (e.g. Spanish L-*parecer* and English *seem*) and covert intervening experiencers (e.g. English *seem* and L-*parecer* with *pro* experiencer, the latter still to be tested).

Regarding the important question of learnability, we hypothesized that implicit arguments are projected on the basis of positive evidence provided in the input, i.e. overt experiencer arguments accompanying *seem* and L-*parecer*, paired with a UG principle 'Project Implicit Argument' (PIA). This parsimonious principle ensures a verb always selects the same arguments (at least in passives and raising) (see relativized UTAH, Baker 1997). We leave for future research the question of whether a principle of this sort can be extended to implicit arguments in general. Additionally, economy considerations push Spanish-speaking children to a dual verb analysis of *parecer*.

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