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The acquisition of mood selection in Spanish relative clauses*

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ABSTRACT

Although children acquire Spanish subjunctive morphology early in the process of language acquisition, they only master mood selection in a staged process that lasts for several years. This paper examines the possibility that the acquisition of subjunctive mood selection in particular syntactic contexts is constrained by cognitive development in the area of representational theory of mind. Acquisition of the epistemic aspects of the semantics of subjunctive are shown to be associated with the understanding of false beliefs, a landmark development in children's cognition. Twenty-two Spanish speaking children between the ages of 3;5 and 6;11 participated in an elicited production study designed to test whether children's ability to produce subjunctive relative clauses was related to their ability to pass a false belief task. Results indicate a strong correlation between children's ability to use the subjunctive mood in relative clauses and their capacity for understanding false beliefs.

INTRODUCTION

Certain aspects of cognitive development constrain the process of language acquisition by limiting the set of semantic representations available to the child. This can provide a solution to at least one of the puzzles in language

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development: why related structures of similar formal complexity are sometimes acquired over a span of several years. The acquisition of the subjunctive mood in Spanish is one of these cases.

Data on the acquisition of Spanish show that the morphological subjunctive paradigm is acquired by the age of two (López-Ornat, Férnández, Gallo & Mariscal, 1994). Despite this early achievement, children acquire selection of the subjunctive mood in clusters of contexts in a process that spans over a period of six or seven years (Blake, 1980). This situation of 'protracted acquisition beside formal similarities' (Johnston, 1985) can be explained by the different cognitive prerequisites imposed by the semantics of the various contexts of use of the Spanish subjunctive. This article explores the role played by cognitive development in the acquisition of the subjunctive, specifically in children's understanding of false beliefs.

The semantics of Spanish subjunctive

Mood is a grammatical category whose function is to 'describe the actuality of the event in terms such as possibility, necessity or desirability' (Chung & Timberlake, 1985). From a semantic perspective, mood characterizes an event by comparing the event to the actual world. From a semantic perspective there are three basic modalities: epistemic, epistemological and deontic. Epistemic modality expresses the relationship of an event to possible worlds. It is classified into 'epistemic possibility' when the event is actual in at least one alternative world and 'epistemic necessity' when the event is actual in all alternative worlds. As opposed to epistemic modality, which involves only the event *per se*, the epistemological mode evaluates the actuality of an event with respect to the source or participant target. The deontic mode characterizes an event as not necessarily actual by virtue of the fact that it is imposed (by obligation or permission) on a given situation.

There is wide linguistic variation in the use of mood morphology to express non-actuality. In Spanish, subjunctive mood is used in a complex array of constructions, sometimes dependent on obligatory grammatical processes and sometimes as an optional marker with special meaning. The Spanish subjunctive depends on the various semantic modalities (deontic, epistemic, and epistemological) in the different syntactic contexts in which it can appear (Lozano, 1995). In complement and matrix clauses, use of the subjunctive depends on the semantics of the epistemological and deontic modalities. In adjunct clauses, such as relative clauses and temporal clauses, one may argue that mood selection is governed by the semantics of epistemic modality.

Epistemic modality characterizes the relationship of an event to possible worlds: it evaluates whether the event is actual in some, or all, possible worlds. Use of indicative in relative clauses has been said to select specific individuals from the set of entities described by the complex NP.

(1) *Busco una casa que* ***tiene*** *paredes moradas*
look-1Sg a house that has-IND purple walls
'I am looking for a house that has purple walls'

Example (1) can be uttered if an specific purple-walled house is in mind, let's say, I have been told that there is a peculiar purple house in my town, and I wish to see it, but I don't know the precise address. Descriptions of specific entities are expressed with indicative relative clauses, while subjunctive relative clauses only have what Quine has referred to as a 'notional sense' of the description, also referred to as a non-specific sense (Gonzalo, 1990; Rivero, 1990) or non-individuated sense (Guitart, 1994). Example (2), the subjunctive counterpart of (1), does not refer to any individual house, but to the class of purple houses. A person with a taste for unusual color in houses could utter the sentence in (2), if no specific house is intended:

(2) *Busco una casa que* ***tenga*** *paredes moradas*
look-1Sg a house that has-SUBJ purple walls
'I am looking for a house that has purple walls'

The intended meaning is 'a purple house, if it exists'. This is further demonstrated by the following examples in Guitart (1994). Note the difference in the English translations of examples (3a) and (3b):

(3) a. *Hare lo que quieres*
do-FUT it that want-IND
'I will do what you want'
b. *Hare lo que quieras*
do-FUT it that want-SUBJ
'I will do whatever you want'

One of the semantic consequences of this relationship between specificity and mood is that an utterance such as (1) presupposes the existence of (at least) one member of the set, while (2) lacks such presupposition. Similarly, (3a) refers to some actual wishes, while (3b) to any possible wishes. This distinction can be further demonstrated by the pragmatic anomaly caused by the second conjunct (bolded) in sentences (4) and (5):

(4) *Solo cazo osos que entren en mi*
only hunt bears that enter-SUBJ in my
propiedad, ***y como no hay, no cazo***
property and as not is not hunt
'I only hunt bears that may enter my property, and since there are none, I don't hunt'

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(5) #*Solo cazo osos que entran en mi*
only hunt bears that enter-IND in my
propiedad, ***y como no hay, no cazo***[1]
property and as not exist not hunt
'I only hunt bears that enter my property, and since there are none, I don't hunt'

In (4) the meaning of the subjunctive relative is compatible with the non-existence of bears in my property. Use of the indicative relative clause in the parallel example renders the bolded phrase in (5) semantically anomalous.

Formal semantics has shown that the notion of 'possible worlds' has been very useful in handling important aspects of natural language such as propositional attitudes and modality (Martinich, 1985; Bach, 1989). According to this view, the interpretation of an utterance expressing modality requires computation of the truth value of the utterance in various possible worlds other than the actual world. A sentence such as *it may rain*, to be true, requires that the proposition *it rains* be true in at least one possible world. This approach can easily describe the effects of modality in the interpretation of relative clauses. The difference between an indicative relative, which describes an individual entity in the actual world and a subjunctive relative, which describes any member of a possible class of beings, is that to compute the truth of the former only one possible world is necessary. A subjunctive relative clause, in contrast, would demand access to other possible worlds.

Cognitive constraints on language learning

Generative linguistics assumes that language is an independent module of the human mind (Piatelli-Palmarini, 1980; Fodor, 1983). The developmental counterpart of the modularity hypothesis is the belief that language development is guided by an independent language acquisition device which constrains the hypotheses that child-learners make about language structure (Chomsky, 1981). However, belief in the modularity hypothesis is not incompatible with evidence of the interaction between cognitive and linguistic development (Piatelli-Palmarini, 1980: 138; Karmiloff-Smith, 1994). Evidence of this type of interaction in language development is to be expected, and has been clearly identified in some domains of the grammar (Bowerman, 1989).

An independent language module may interact in development with other cognitive systems in at least two ways: by virtue of general structural constraints on learning, or by virtue of the limits that children's available knowledge may set on their ability to discover linguistic patterns (Johnson,

[1] # indicates syntactically well-formed but semantically anomalous.

1985). This latter form of 'cognitive pacesetting' has been invoked as an explanation for the staged development of certain sets of linguistic properties (Slobin, 1985: 1158).

The acquisition of mood selection presents specific cognitive challenges to children. It requires that children be capable of allowing mental representation of events that are independent, or even incompatible with the reality of physical events. This ability has been referred to as a 'representational theory of mind'. Research on cognitive development has shown that very young children have a complex but incomplete understanding of mental phenomena (Wellman, 1990). On the one hand, young children have an elaborate theory of the mind: they are aware that imaginings and beliefs are mental phenomena, and that mental images are separate from objects in the real world. On the other, the evidence shows that younger children fail to comprehend the indirect nature of others' beliefs (Wimmer & Perner, 1983; Wellman, 1990). Important developments in this area emerge around children's fourth birthday. Three-year olds typically differ from four-year olds in their ability to attribute false beliefs to others. In one type of false belief task, the changed location task, children are told a story about a character who sees an object hidden in a location, and in the character's absence, the object is moved to a new hiding place. Children age four and older give the correct answer: the character will look for the object in the first location because she mistakenly believes it is still there. Younger children consistently fail at this task, predicting that the character will look for the object where it really is, rather than where he or she should expect it to be. Children's difficulty with false belief presumably follows from their understanding that belief is a 'copy' of reality rather than a 'constructed representation' of it (Wellman, 1990). For that reason, young children attribute to others beliefs that faithfully represent reality, without regard to how or when this belief was acquired. Children's ability to understand false beliefs changes radically between the ages of three and six.

The capacity to represent mental phenomena must be in close relationship with the ability to produce the specific grammatical structures that allow reference to mental phenomena. Recent investigations of the interplay between children's development of theory of mind and development of complex syntax suggests that the cognitive and the linguistic modules are able to influence each other in development (de Villiers & Fitneva, 1996; Gale, de Villiers & Pyers, 1996; Tager-Flusberg, 1996). Language plays a role in the emergence of new forms of conceptualizing events, but at the same time, cognitive development seems to open the pathways to analyse certain complex syntactic structures. In the case of mood in Spanish, this leads to the hypothesis that development of the capacity for mental representation of non-actuality can trigger acquisition of the linguistic representation of presuppositions of actuality/non actuality. In particular, this hypothesis

links understanding of false beliefs to the ability to represent the presuppositions associated with mood selection in Spanish relative clauses.

Stages in the acquisition of Spanish subjunctive

Children's errors on the acquisition of the subjunctive in the Romance languages involve substitution of the indicative verbal form for the subjunctive (Clark, 1985; Feingold, 1994). In contrast to literature on French, which describe subjunctive as a 'late acquisition', studies on Spanish show that subjunctive morphology is acquired very early, at least in certain contexts (Blake, 1980; Blake, 1983; Hernández-Pina, 1984; Clark, 1985; López-Ornat, Férnández, Gallo & Mariscal, 1994).

Longitudinal studies identify early instances of correct usage of the subjunctive form and early mastery of the morphological paradigm. Hernández-Pina (1984) reports the child Rafael using it in commands and indirect commands early during the third year, as illustrated by (6) and (7), respectively.

(6) *No bebas*, *sufa* (Rafael, 2;0)
not drink-SUBJ dirty
'Don't drink, (it is) dirty'

(7) *Dile que venga* (Rafael, 2;4)
tell-him that come-SUBJ
'Tell him to come'

López-Ornat *et al.*'s (1994) longitudinal study reports similar findings: the first correct usage of the subjunctive emerges at the age of 2;1. In their analysis, López-Ornat and colleagues suggest that, although correct subjunctive morphology emerges at that point, acquisition of the form is the result of a gradual process. They argue that the process of acquisition depends on the linking of semantically related but linguistically distinct structures, which happens, in the case of the subjunctive morphology paradigm, by gradually building up from the imperative/command system, starting from second person commands, and increasing in complexity. Crossectional studies in the acquisition of Spanish morphology such as Aguado (1988), Cortés & Vila (1991), etc. confirm the time of emergence and uses of present subjunctive observed by Hernández-Pina and López-Ornat.

In an analysis of elicited narratives of 35 children aged 3;3 to 6;3, Naharro (1996) found that all but one of the older children were able to use subjunctive at least once in their narrative. She found that of all the opportunities children had to produce a sentence, children used the subjunctive as frequently as the indicative. She concluded that, from the age of 3;3, Spanish children had no problem utilizing subjunctive to refer to a past or a simultaneous event, and finally, that there were no significant differences in the performance of the older and younger children.

Despite the early acquisition of the subjunctive form, and apparent success in the use of subjunctive in narratives, there is evidence that correct use of the subjunctive is not applied with equal success in all contexts, revealing significant differences between children and adults. Blake (1983) studied production of subjunctive in a sentence completion task in a large population of Mexican children aged 4 to 12, in comparison to a control group of Mexican adults. His results indicated that error rates varied widely across the different syntactic conditions and improved significantly with age. Four-year old children in this study exhibited error rates as low as 11% (for adverbial clauses) and as high as 50% (for some sentential complements).

Blake's data on error rates can be translated into a developmental timetable for the disappearance of errors in mood selection (Blake, 1980). Appropriate mood choice emerged in his data earlier in the case of indirect commands and adverbial clauses. Production of subjunctive in relative clauses in NPs referring to non actual entities was the category with the next lowest error rates at the early ages. Error rates for the remaining contexts (sentential complements to verbs of doubt, assertion and attitude) required several years to achieve adult levels. Remarkably, the last mood selection error to be eliminated from child Spanish was incorrect selection of indicative in complement clauses to factive emotive verbs such as *alegrarse* 'to be glad that'. This developmental course can be summarized as in (8):

(8) indirect commands > adverbial clauses > relative clauses > sentential complements

This acquisition sequence finds support in the longitudinal studies. The data in both the Hernández-Pina and the López-Ornat *et al*. studies indicate that direct and indirect commands are the first context of acquisition of subjunctive.

This developmental timetable can be interpreted along modality lines: the initial uses mastered by children seem to fall under deontic modality; commands and indirect commands. Subsequently use of the subjunctive is mastered in adverbial clauses and relative clauses, which fall under the epistemic modality. Finally, the last context of use to be acquired is in sentential complements, where the use of subjunctive follows from epistemological modality.

Note that this order cannot be simply derived from patterns of optionality and obligatoriness in the input data. Subjunctive is obligatory in purpose clauses (clauses after the preposition *para* 'for') and in the complement clauses to several verbs, including volitional and factive emotive verbs. However, children are able to acquire selection of subjunctive in relative clauses (where it alternates with indicative) before selection of subjunctive in complements to factive emotive verbs (where it is obligatory).

The pattern of acquisition described above for the Spanish subjunctive,

where deontic uses (command and indirect commands) appear prior to epistemic uses (relative clauses and purpose clauses), parallels some of the evidence on the emergence of modals in the production of English speaking children (Hirst & Weil, 1982). Crosslinguistic coincidences in the acquisition of modality lend support to the notion of a cognitive pacesetting for some aspects of language development. As an additional factor suggesting maturational constraints, one must consider the evidence that significant changes in the error rates of use of subjunctive in relative clauses (which, as we suggested, expresses an epistemic contrast) occur around the age of four. This temporal frame places mastery of subjunctive relatives at about the same time that important changes in children's development of theory of mind, as discussed above.

For cognitive-based explanations for the staged development of the Spanish subjunctive to succeed, a precise link must be established between particular cognitive skills and the semantics of the Spanish subjunctive. In other words, what exactly is missing in younger children's mental representation of events that prevents them from learning the uses of the subjunctive all at once? I propose to focus on mood selection in relative clauses, for the following reasons:

(*a*) The use of subjunctive in relative clauses follows a pattern of surface optionality, i.e. that children may not be acquiring mood selection only by noting distributional associations. This differs from, for instance, purpose clauses, where the preposition *para* obligatorily cooccurs with subjunctive (*para que vengas*), or from temporal clauses, where mood is linked to tense (*se reira cuando cantes* 'he will laugh when you sing-SUBJ', but *se rió cuando cantaste*, 'he laughed when you sang-IND').

(*b*) The semantic complexity of the non-actuality expressed by subjunctive in relative clauses goes beyond that of linguistic expressions of desire. There is no doubt that commands involve clear reference to non-actuality. However, the semantics of commands, like that of the future tense, involves a simpler type of schema: a contrast between the current and actual world, and a future or desired one. In contrast, the semantics of the non-specific, notional interpretation of a relative clause makes no assertions about the actual world, e.g. *una casa que tenga paredes moradas* ('a house that has-SUBJ purple walls'). Instead, it makes reference to the possible event (to be found among all possible worlds), in which such house happens to exist. The frame of reference is wider in this case than in the case of commands, because multiple possible worlds must be considered simultaneously.

A study on the acquisition of relative clauses has produced evidence which suggests that there may be a stage in which children have acquired indicative relative clauses, are productively using subjunctive, but fail to apply it with relative clauses in contexts where subjunctive would be obligatory for adults (Pérez-Leroux, 1993). Spanish speaking children aged 3 to 6 were read a

story in which a character was looking for something or someone. As in standard relative clause elicitation protocols, there were items similar to the target object present in the context in order to create the need for elaborate descriptions. Crucially, the story provided strong indications that the target object did not exist. For adult speakers the task required production of subjunctive relatives. All the older children in the study produced subjunctive relatives but some of the younger children failed to do so. It was not the case that these children had difficulty using subjunctive or producing embedded clauses, since all of them were able to use subjunctive mood with purpose clauses, which were elicited in a follow up question. Thus, they clearly had knowledge of subjunctive form, but not of its use with relative clauses. The study yielded an additional observation: some of the younger children incorrectly used a definite article in their descriptions, as shown by the example in (9):

(9) *al niño que no esté trabajando eso* (Maria Rosa, 3;11)
to-the boy that not is-SUBJ working that
'The boy that is not working on that'

This was pragmatically odd because the referent for a SPECIFIC child had not been introduced in the story. Interestingly, the children who produced these patterns also produced sentences that seemed to refer to the described entities as actual, contrary to the demands of the elicitation task. For instance, while discussing one story about a boy who wanted to be read a storybook, one child declared that this boy in the story was looking for his mother. This contradicts the central point of the story, which was that all family members, including the mother, were too busy and had refused to read the boy a book.

(10) a. *A la mamá. Para que le lea el cuento.* (Maria Rosa, 3;11)
to the mother. for that her-DAT read-SUBJ the story
'The mother, to read her the story'

In response to the same story, another child referred to an additional brother not present in the picture. A third child gave the most surprising response of all, explaining that the boy was looking for nobody, 'because nobody was there'.

(11) a. *A nadie, porque nadie no está ahí.* (Gaby, 3;8)
to nobody, because nobody not is-IND there
'Nobody, because nobody is there'

These examples were the basis for the hypothesis that the younger children, (i.e. those who failed produce subjunctive relatives despite having acquired both the structure of relative clauses and use of subjunctive in

purpose clauses) had not mastered selection of the subjunctive because they could not interpret the entities described by the task as non-actual.

I have suggested above that what is missing is the full capacity for mental representation of non-actuality, perhaps the same capacity underlying children's limitations on understanding of false beliefs. From a perspective of formal semantics, these two capacities have something in common: the ability to consider more than one possible world in the relevant computations.

The capacity for making behavioural predictions of others by attributing false beliefs to them requires that one consider at least two 'possible worlds', or state of affairs: the actual states of affairs, and the false construct that individuals holding the false beliefs presumably have. To predict that someone will look in the wrong place, based on what I know about when or how the person acquired the incorrect information, I need to hold the two relevant possible worlds in mind. As discussed above, the same ability underlies our natural understanding of modality in language. This analysis of mood in Spanish can establish a direct link between children's capacity to consider multiple possible worlds and their ability to understand the epistemic values of the subjunctive.

The proposal that children would have difficulty accessing multiple worlds in their semantic computations predicts that a young child hearing an example such as (2) would construe it as referring to an actual specific house.

A study was designed to test the hypothesis that children's acquisition of subjunctive in relative clauses depends on their representational capacities. The study aimed to examine the relationship between children's performance on false belief tasks and their ability to produce subjunctive relative clauses.

METHODS

Subjects

A group of 22 monolingual Spanish speaking children participated in the study. Subjects were recruited at a Montessori school in the Dominican Republic, after obtaining the consent of teachers and parents. The children were between the ages of 3;5 and 6;11, and the median age was 4;5. The group was composed of 12 girls and 10 boys, raised in upper middle class households.

Procedures

Children were interviewed individually, in a room adjacent to their classroom, and the interviews were videotaped and transcribed. The session included two tasks. The first consisted of two stories designed to assess understanding of false beliefs without requiring processing of complex sentences. Children were told the story translated in (12), followed by the question translated in (13); the Spanish is given in Appendix 1. The toys

were manipulated to demonstrate the story, and then given to the children when asked to demonstrate their response.

(12) False belief story:
I will show you what the bunnies do. This is mother Bunny and this is little Rabbit. When she was not in, Baby came and put it under the table.

(13) When the mother comes back, where will she look for her carrot?

Both physical and verbal responses were counted. Responses were coded as correct if the children answered 'in the refrigerator', and as incorrect if they answered 'in the closet'.

Afterwards, children were taught a game called *busca*, *busca* ('searching, searching'), designed to elicit subjunctive relative clauses; it consisted of eight stories accompanied by pictures. The children were told that in this game there was always a character who was looking for something or somebody for help, and that their job was to identify who or what this character was looking for. As in standard relative clause elicitation procedures, this task introduced several items of the same kind, to create a situation where a simple NP would not be a sufficient response. The *busca* procedure differs from other relative clause elicitation tasks in that here the story tries to convince the listeners that there is nothing that would fit the description. To illustrate, one story had the cook looking for a hen that would lay eggs for breakfast (Appendix 1 includes the original story in Spanish).

(14) Subjunctive elicitation story:
The cook needs eggs for breakfast. She went out to look for the hens.

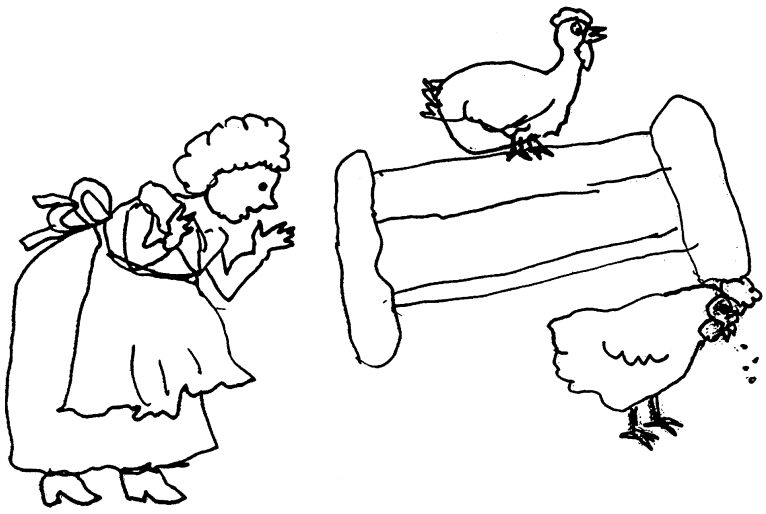

Fig. 1. Subjunctive elicitation story: ... looking for a hen that would lay eggs.

This hen does not lay eggs because she is eating. This other one does not lay eggs because she is sitting on the fence and is very lazy.

The illustration showed that none of the entities present would be able to help the main character (all the hens in the picture were busy, in this case). The children were then asked a question such as (15):

(15) *¿Qué busca la cocinera*?
what looks the cook
What was the cook looking for?

If subjects correctly interpret the situation as lacking implications that the hen searched for exists, a correct response would describe it with a subjunctive relative clause, as in (16):

(16) *una gallina que ponga huevos*
a hen that lays-SUBJ eggs
a hen that would lay eggs

If not, other responses might be expected. The task was presented to three adult controls (all three were parents of children participating in the study), and all items were successful in eliciting subjunctive relative clauses from adult native speakers.

RESULTS

Production of relative clauses

Responses to both tasks were transcribed and analysed. A control group of five adults uniformly produced subjunctive relative clauses (henceforth SRC) in their responses to the *busca* game. Among the children, this task elicited 46 subjunctive relative clauses, in addition to 7 indicative clauses such as those in (17) and (18):

(17) *a su amiguito que quiere jugar* (Maria Fernanda, 3;7)
to his friend that want-SUBJ play-INF
'his friend who wants to play'

(18) *a otro que sabe pintar otras cosas* (Carolina, 5;7)
to another that knows-IND to paint other things
'for another one who knows how to paint other things'

The remainder of the responses observed were simple indefinite NPs as in (17), occasionally followed by a purpose clause as in (18). These are grammatical but syntactically simpler alternatives to relative clauses which children frequently produce in tasks aimed at eliciting relative clauses in general (Ferreiro, Othenin-Girard, Chipman & Sinclair 1976; deVilliers, 1988).

(19) *una gallina con huevos* (Germán, 6;5)
a hen with eggs
'a hen with eggs'

(20) *a una gallina para poner huevos* (Cesar, 3;7)
to a hen for lay-INF eggs
'a hen to lay eggs'

Most responses had the expected indefinite + subjunctive structure shown in (21). Four examples with the subjunctive relative clause response had a definite article, as in (22):

(21) *a un niño que juegue con el pelota* (Eduardo, 4;3)
to a child that plays-SUBJ with the ball
'for a child that plays with the ball'

(22) *Al que pinte muñequitos* (Maria Fernanda, 3;7)
to-the one that draws-SUBJ comics
'one that draws comics'

On the average, production of SRCs increased with age, as did the proportion of children producing any SRC. Table 1 shows the developmental trends.

Table 1 shows that the ability to produce subjunctive relative clauses increases with age. Further analysis of the data, however, suggests that age was not the best predictor of performance on the elicitation task. Data on production of subjunctive relatives and on performance on the false belief task was plotted along with the children's age in Figure 2. This figure does not reflect a clear picture of development. Figure 3 graphs individuals' performance on the false belief task against the number of relative clauses they produced, showing that cognitive development is a relevant factor.

The results indicate a modest positive association between children's age and their ability to pass the cognitive test, as measured by a point biserial correlation coefficient ($r = 0.4155$, $t = 2.04286$, df = 20, $p < 0.05$). However, the correlation between age and ability to produce a relative clause, although positive, was not statistically reliable ($r = 0.35$, $t = 1.67093$, df = 20, $p > 0.05$). A partial correlation between theory of mind and production of SRCs controlling for age was positive and reliable ($r = 0.589$, $p < 0.05$). In sum, these data indicate that, for this group of children, age was not a strong predictor of the ability to produce subjunctive relatives.

Acquisition of subjunctive relatives and understanding of false beliefs

There was a clear association between passing the cognitive test and ability to produce subjunctive relatives. Table 2 shows the number of children passing none, one or both cognitive tests, and the number of subjunctive relatives produced by those children.

The degree of association between passing the cognitive test and producing

TABLE 1. *Average number of subjunctive relative clauses produced by age group*

Group	No. of children producing SRC	Average SRC produced
ages 3;5–4;0 ($n = 8$)	2/8	1.25
ages 4;1–5;1 ($n = 6$)	4/6	2.50
ages 5;7–6;11 ($n = 8$)	6/8	2.63

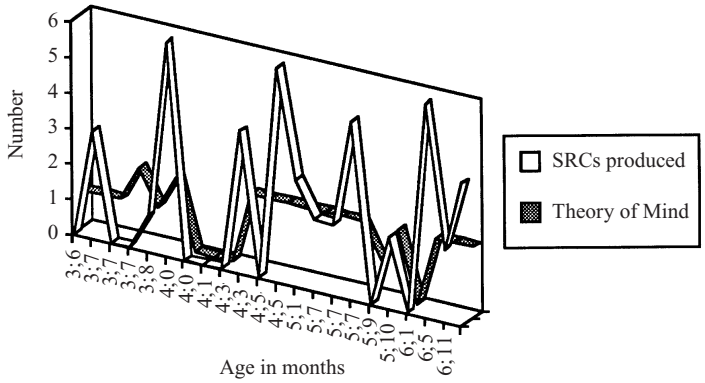

Fig. 2. Individual children's performance in the theory of mind test and their production of subjunctive relative clauses, ordered by age.

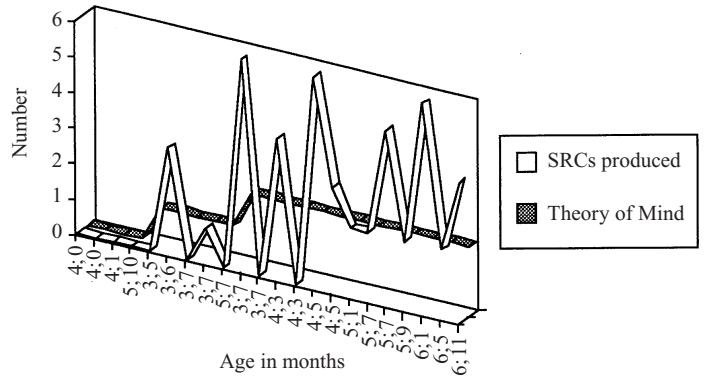

Fig. 3. Individual children's production of subjunctive relative clauses related to their performance in the theory of mind test.

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TABLE 2. *Observed number of children producing given numbers of subjunctive relative clauses*

	Number of subjunctive RCs produced						
False belief test	0	1	2	3	4	5	6
Failed both	4	0	0	0	0	0	0
Pass one	3	1	0	1	0	0	0
Pass both	2	0	4	1	2	1	3

subjunctive relative clauses was measured employing the gamma coefficient proposed by Goodman & Kruskall (1979). The gamma coefficient is a measure of association recommended for categorical or ordinal measures (Agresti, 1984). The number of relative clauses produced was treated as an ordinal measure given the small number of possible outcomes (not producing, producing one, two, three, etc.). The analysis revealed a very strong correlation between ability to pass the cognitive test and ability to produce subjunctive relative clause (estimated $\gamma = 0.852$).

A logistic regression analysis was performed on the data to test whether children's acquisition of subjunctive relative clause was dependent on their ability to pass the cognitive test. The odds ratio of the two measures (passing the cognitive test and producing subjunctive relative clauses) was estimated at 19.25. This means that the odds of producing when passing are 19.25 times the odds of producing when not passing. The logistic regression analysis yielded a beta coefficient estimate of 2.9575, $z = 2.6627$. This analysis allows us to reject the null hypothesis that passing the test had no relation to the ability to produce subjunctive relative clauses at $p = 0.0039$.

DISCUSSION

Very young children show early mastery of the morphological mood paradigm. They are able to use subjunctive unfailingly with its deontic value, in expressing commands and with complements of deontic verbs. Those children are not able to transfer these achievements to describe non-actual entities by means of a subjunctive relative clause, even long after relative clauses have entered their grammar. The results in this study support previous observations that children's mastery of selection of the epistemic values of mood selection in Spanish occur around the ages of 3 and 4. Prior to emergence of SRCs, children use subjunctive with purpose clauses (which, as I pointed out, is another epistemic context). However, this does not demonstrate that young children can understand its epistemic value, given that subjunctive use after the purpose preposition *para* is obligatory. Acquisition of subjunctive in relatives, in contrast, is better evidence for

acquisition of the semantics, because it is not governed by surface syntax but by the semantic interpretation of the clause.

The results of the present experiment can be interpreted to support the hypothesis that understanding of false beliefs is a cognitive prerequisite for the acquisition of the epistemic values of the Spanish subjunctive. Development in the area of theory of mind strongly shows strong association with development in the area of complex syntax. Since the effects occur at the level of semantics, the level where the grammar module is suppose to interact with general cognition, these results remain compatible with the hypothesis about the modularity of syntax.

One question remains: what is the exact nature of the changes in children's cognitive make-up that so affects their grammar? A prevailing view is that children acquire a representational theory of mind. This representational theory of mind entails the recognition that beliefs, perceptions and utterances are representations of reality and therefore can misrepresent it. Changes in understanding of false beliefs have been also correlated to children's ability to understand that beliefs can be held with various degrees of certainty (Moore & Davidge, 1989). This approach could explain the stages in the acquisition of the subjunctive in the following manner. In order to talk about what is not actual, and to master the morphological encoding of events as actual or non actual, children must first understand that individuals, themselves or others, can think of events as actual even if they aren't. Lacking a representational theory of mind, young children learning Spanish will not be able to tease apart the semantic values of mood selection in those contexts. For these young children, indicative and subjunctive mood in relative clauses must appear to be in free variation. For that reason, they will often use the more frequent indicative form.

An alternative view emerges from Fodor's (1992) criticisms of current views on the incompleteness of young children's theory of mind. Fodor points to experimental results that suggest that young children understand deception and can use false belief to explain others' misguided behaviour before they can successfully predict a character's actions on the basis of his or her false beliefs. If children understand error and deception, they must possess a representational theory of mind. To explain the failure of younger children in the false belief task, Fodor suggests a performance account. He proposes that both children's and adults' theory of mind contains two basic heuristics: the first is that agents act to satisfy their desires, and the second, that agents act in a way that would satisfy their desires if their beliefs were true. In his proposal, younger children rely primarily on the first heuristic, leading them to predict actions for agents without considering their mental states. As their computational capability increases, they will be able to make behavioural predictions using also the second heuristic.

In Fodor's (1992) theory, there is no discontinuity in children's cognitive

development, just an increase in their capacity to use alternative heuristics to make behavioural predictions. This account leads to a different explanation of Spanish children's initial failure to use subjunctive in relative clauses. According to this account, the primary heuristic considered by children is that agents act to satisfy their desires. In the task we used, the agents involved were seeking a non-existent entity. Fodor's account would explain children's failure to use subjunctive as a failure to recognize that the agent's action (looking for something) depends on a misrepresentation (the object searched for does not exist). Using the first heuristic, children would assume that agents act to satisfy their desires (which would only happen if the object exists), and therefore accept the questionable existence of the object of the search (in other words, why look for that which does not exist?). This could easily explain the unexpected response reported above in (9).

Based on the discussion on semantics above, I will outline a third possibility, which is inspired by the performance approach, but differs in the actual content of what aspect of performance changes from childhood to adulthood. Suppose, with Fodor, that children are no different from adults in the contents of their theory of mind. In addition suppose that they are different in how costly it is for them to access other possible worlds in their semantic computations. Like Fodor's, this approach can explain the asymmetry between explaining past behaviours and predicting future behaviours. Explaining past behaviours would force the child to understand error as the source of a character's unusual actions (looking in the wrong place), by making obvious the character's erroneous representation of the world. In contrast, in making predictions of future behaviours (as when answering 'where will she look for the carrot'?) the child would only rely on the simplest computations, exclusively involving the actual world.

These alternative views of the development of children's interpretation of mental events are equally able to explain the acquisition of Spanish subjunctive relatives, although with a different degree of explicitness as to the exact nature of the interaction between cognition and language. The essential conclusions of the study remain the same: that the temporal setting of the acquisition of Spanish subjunctive depends on increased interpretive abilities on the part of the children, and that these abilities are strongly associated with independent cognitive development. Interpretation of these findings is limited by the correlational nature of the study: we are not warranted to assert that, based on the data, development in the area of theory of mind causes acquisition of SRCs. The data is neutral between this interpretation and an interpretation in which the development of an entirely different skill underlies both behaviours. I have offered some speculations on the latter possibility by considering one aspect of performance capabilities.

López-Ornat *et al*. argue, in discussing the early stages of the acquisition of the subjunctive, that it is essential to examine the process of acquisition

and not merely the results (López-Ornat *et al.*, 1994). In the present study I have focused on one segment of the development (the ages between 3 and 6) and one construction (the relative clause construction) in order to try to gain a more precise understanding of the semantic issues underlying the acquisition of mood. The data shows a very strong correlation between understanding of false belief and ability to use SRCs in an appropriately controlled context. I have argued that this link can be explained in terms of the semantics of each ability, and that this becomes evident once one assumes the perspective of possible world semantics.

It is clear, from examining the lengthy course of the acquisition of mood selection in Spanish, that knowledge of the Spanish subjunctive system is not a block achievement. The present study confirms earlier findings by Blake (1980) that acquisition of mood selection occurs in a series of steps. The present study also suggests a new perspective on the process by arguing that acquisition of mood choice is dependent on semantic development, and that the semantic development can be linked to independently established changes in children's cognitive capacities.

In conclusion, the study of acquisition of Spanish subjunctive shows intricate and close connections between the development of complex event interpretation during childhood years and the development of important aspects of complex syntax.

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APPENDIX

Task 1 : False belief stories

Introduction: Te voy a enseñar lo que hacen los conejitos. Esta es la mamá coneja, y este es el bebé conejito.

TM1. El bebé puso su chupete en la despensa y salió a jugar. Cuando él se fué su mamá llego y abrió la despensa. Sacó el chupete y lo puso en la gaveta. El bebe volvió al rato a buscar el chupete.

Prompt: ¿Dónde va a buscar el bebé su chupete?

TM2. Mamá puso el bizcocho en la despensa. Entonces se fué de la cocina. Cuando no estaba, Bebé vino y lo puso debajo de la mesa.

Prompt: Cuando mamá vuelva, … ¿Dónde va a buscar el biscocho?

Task 2 : Relative clause elicitation

Introduction: Vamos a jugar a un juego que se llama 'Busca, Busca' …

RE1. El niño quiere unos zapatos verdes. Pero esos no los quiere porque no tienen lazos.

Prompt: ¿Que busca el niño?

RE2. La cocinera necesita huevos para el desayuno. Salió a buscar las gallinas. Esa gallina no pone huevos porque está comiendo. Esta otra no pone huevos porque esta sentada en la cerca y es muy haragana.

Prompt: ¿Qué busca la cocinera?

RE3. Pepito quiere jugar pelota. Busca a la hermanita pero es muy chiquita y todavía no sabe jugar. Va donde el niño del frente y no está y no puede jugar.

Prompt: ¿A quién busca Pepito?

RE4. El papá va a pintar la casa y necesita ayuda. Va donde la mamá pero ella está cocinando. Va donde el hijo pero está viendo la tele.

Prompt: ¿A quién busca el papá?

RE5. El niño quiere sentarse cómodo. Esta silla no tiene cojín. Esta tampoco.

Prompt: ¿Qué busca el niño?

RE6. La cocinera tiene que cortar una carne. Coge un cuchillo pero no corta bien. Coge otro pero ese es para untar mantequilla.

Prompt: ¿Qué busca la cocinera?

RE7. La niña quiere oir música. Este radio no sirve porque tiene la antena rota. Este tampoco porque le faltan pilas.

Prompt: ¿Qué busca la niña?

RE8. Al maestro de dibujo le gustan los cuadros de paisajes. Va donde el primer alumno pero ese dibuja animales. Va donde la otra alumna pero esa dibuja flores. Va donde otro alumno y ese no pinta nada.

Prompt: ¿A quien busca el maestro?