

## How Spanish-English bilingual children approach entailment-based scalar implicatures

Scalar implicatures (SIs) ([1]) are a linguistic phenomenon of particular interest, because they represent a pragmatic layer of language usage above and beyond pure logical (semantic) content. Although (1) is true if each boy in a group scores a goal, a speaker delivering this utterance is understood as indicating that some, but not all, of the boys scored a goal.

1. Some boys scored a goal.

Cross-linguistic evidence shows that children generally do not demonstrate adult-like ability to compute SIs ([2]-[6]), although some task manipulations improve performance ([6]-[8]).

One notable exception is Spanish-speaking children, who appear to calculate a ‘some-but-not-all’ implicature by age six ([9]-[10]). Spanish has two words for *some*: while *algunos* encodes the implicature, *unos* does not. This contrast between Spanish and other languages led us to wonder how Spanish-English bilingual children fare with SIs, asking whether they pattern with their monolingual counterparts (calculating the implicature – Spanish – or failing to – English) or if they exhibit a unique pattern. Our experimental results argue in favor of the second option.

Experiment 1: 27 children (3;4-5;5 M=4;3) participated in a Forced-Choice Selection Task in which four scenes were pitted against each other. In one scene, each object in a set shared the same property (‘whole set’); in another, only some of the objects had the property (‘subset’). (Figure 1) Test sentences were statements with *algunos*, *unos*, and *todos* (n=3 each). Children’s choices were almost evenly distributed between ‘whole set’ and ‘subset’ scenes. (Table 1) To further examine whether children distinguished between these determiners, we targeted experiments providing additional contextual support.

Experiment 2: 18 children (4;2-5;1 M=4;9) participated in a Truth-Value Judgment Task ([11]). Test items (n=8) included *todos* or *algunos* in stories presenting ‘whole set’ or ‘subset’ scenarios, rendering *todos* statements True/False, and *algunos* statements True but Infelicitous/Felicitous. Children distinguished scenarios for *todos* sentences as expected, but accepted *algunos* statements in both scenarios. (Figure 2)

Experiment 3: 16 children (3;9-5;5 M=5;0) were shown a series of brief video-recorded scenes in which a Speaker requested that the Hearer perform an action with objects, using *unos*, *algunos*, or *todos*. While the Hearer always complied, children had to judge whether the action was performed as requested. Results showed that children not only sharply distinguished between True/False scenarios for *todos*, but also for Felicitous/Infelicitous scenarios for *algunos* and *unos*, though they did not seem to discriminate between *algunos* and *unos*. (Figure 3)

Experiment 4: 24 children (4;2-5;3 M=4;9) participated in an adaptation of [5]’s sentence judgment task for preschoolers, designed to assess their ability to recruit real-world knowledge. Children consistently rejected false sentences as *raro*, but accepted true sentences as *bien*, regardless of the felicity status. (Table 2)

Improved performance with tasks highlighting speaker-hearer interactions may reveal bilingual children’s sensitivity to the status of their interlocutor ([12]-[13]). The comparison between monolingual and bilingual Spanish-speaking children may also show the Principle of Contrast ([14]) at work in the acquisition of Spanish determiners. The results invite further exploration of SIs with a wider range of bilingual populations.

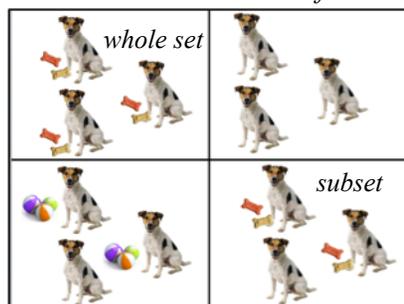
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## Figures and Tables

**Figure 1: Experiment 1 (forced-choice task)**

“Muéstreme dónde **todos los /algunos/unos** perros tienen galletas.”

Show me where all/some of the dogs have cookies.



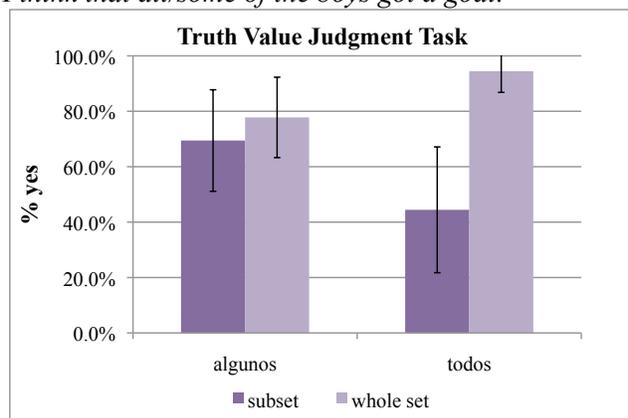
**Table 1: Experiment 1 (Forced-Choice task)**

determiner	% selection	
	subset	whole set
<i>algunos</i>	37.0%	58.0%
<i>unos</i>	43.2%	54.3%
<i>todos</i>	51.9%	43.2%

**Figure 2: Experiment 2 (TVJT)**

“Creo que **todos los/algunos** niños marcaron goles”

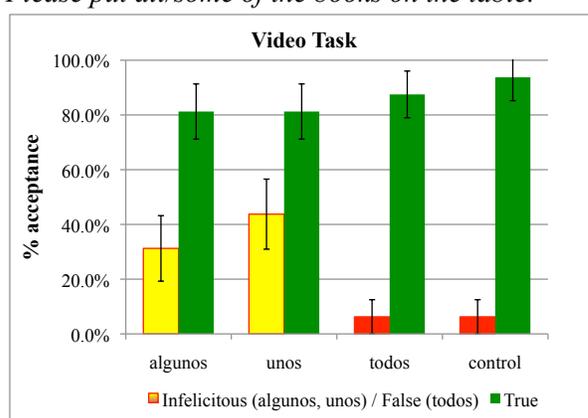
I think that all/some of the boys got a goal.



**Figure 3: Experiment 3 (Video task)**

“Pon **todos los/algunos/unos** libros en la mesa.”

Please put all/some of the books on the table.



**Table 2: Experiment 4 (Sentence Judgment task)**

n=2 each	False and ‘Bizarre’	Felicitous ( <i>algunos, unos</i> ) / True ( <i>todos</i> )	Infelicitous / False ( <i>todos</i> )
<b><i>algunos</i></b>	Algunos caballos cantan. <i>Some horses sing</i>	Algunos gatos son negros. <i>Some cats are black</i>	Algunos perros tienen ojos. <i>Some dogs have eyes</i>
% bien	23.3%	56.6%	61.6%
<b><i>unos</i></b>	Unos pájaros bailan. <i>Some birds dance</i>	Unas flores son amarillas. <i>Some flowers are yellow</i>	Unas casas tienen puertas. <i>Some houses have doors</i>
% bien	13.3%	45.0%	65.0%
<b><i>todos</i></b>	Todas las llaves comen chocolate. <i>All keys eat chocolate</i>	Todas las mariposas tienen alas. <i>All butterflies have wings</i>	Todas las vacas son café. <i>All cows are brown</i>
% bien	10.0%	56.6%	38.3%

## References

- [1] Grice, 1975; [2] Guasti *et al.*, 2005; [3] Huang & Snedeker, 2009; [4] Hurewitz *et al.*, 2006; [5] Noveck, 2001; [6] Papafragou & Musolino, 2003; [7] Foppolo *et al.*, 2012; [8] Miller *et al.*, 2004; [9] Schmitt & Miller, 2004; [10] Vargas-Tokuda *et al.*, 2008; [11] Crain & McKee, 1985; [12] Lanza, 1992; [13] Valdés, 2003; [14] Clark, 1987