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Not just *algunos*, but indeed *unos* L2ers can acquire scalar implicatures in L2 Spanish

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This study examines interpretation of scalar implicatures (SI) in the L2 Spanish of native English advanced learners. Spanish is especially interesting since, unlike English, it has two indefinite determiners, *unos* and *algunos*, which ostensibly map to English *some*. However, each does not allow an implicature like English *some*. The complexity of the Spanish system is predicted to make Spanish particularly challenging. We present data from a Video Acceptability Judgment experiment where the subset – whole set distinction is applied to *algunos/unos*. The videos contain sets of 4 participants, in which 0, 3 or all 4 engage in an action. Test sentences are presented after the video clips in four target conditions: (a) *algunos* with 4 out of 4 (4/4) video, (b) *algunos* with 3 out of 4 (3/4) video, (c) *unos* with 4/4 video and (d) *unos* with 3/4 video. Judgments on the 4/4 video conditions, especially the *algunos* condition, indicate whether implicatures are projected or not. If participants are sensitive to the idiosyncratic restrictions on *algunos* for implicatures, one expects to find a distinction between *algunos* and *unos* in the 4/4 condition, and between 4/4 versus 3/4 conditions with *algunos*. Both participant groups (native speakers and advanced L2ers) perform the experiment similarly. Both groups make the two relevant distinctions to the same degree.

Keywords: scalar, implicature, *algunos*, *unos*

1. Introduction

During communication, speakers of all languages regularly aim to convey more than what they actually utter at any given time. In turn, recipients are readily able

to derive interpretations that are seemingly much more nuanced than the words of the messages they hear. The following sentence illustrates this point:

- (1) Some dogs are friendly.

All English speakers would agree that one possible interpretation from (1) is the assumption found in (2):

- (2) Not all dogs are friendly.

Note that the assumption in (2) does not come directly from the individual lexical items in (1). To get the interpretation in (2), the listener has made an inference about what the speaker said. To account for inferences such as those in (1) and (2), Grice (1975, 1989) established a clear contrast between two basic components of meaning: (i) what a speaker says and (ii) what he or she implies. An implicature is the implied, but non-explicit, meaning of a given utterance. A scalar implicature (SI), like all implicatures, implies an additional meaning apart from the literal meaning of an utterance. Scalar implicatures (SI) are different, however, in that the inferences are made with respect to a gradable scale of available meanings, for example, *<some, most, all>*. When a speaker uses one member of the scale (instead of another), it is assumed that he/she is negating the higher member of the scale, thus *some = not all*. In doing so, the speaker is assumed to be following Grice's Maxim of Quantity, which states that speakers will try to be as informative as required but not more so.

For the scalar term *some* in (1) to be logically true, some and possibly all dogs must be friendly. However, if the speaker's intended meaning is that *all dogs are friendly*, then (1) is logically true but pragmatically inappropriate, given that it is not maximally informative. To communicate the intended meaning in a more pragmatically appropriate manner, the speaker would employ a higher item on the scale, namely *all*, as in (3) below.

- (3) All dogs are friendly.

Grice's Conversational Maxims posit that communication is governed by interlocutors' rational expectations regarding how information is communicated (Grice, 1975), whereby interlocutors are truthful during communication, providing relevant, informative and appropriate utterances. Scalar terms (specifically SIs) seemingly run in contrast to Gricean principles, precisely because despite being easily computable, implicature readings would suggest that some utterances are not maximally informative. Nonetheless, SIs exist in all natural languages and serve particular discourse functions. SI computation is a property at the semantics-pragmatics interface. Thus, their calculation requires the integration of information from grammar internal (semantics) and grammar external (pragmatics)

modules. As such, SIs have proven to be an excellent property for testing formal theories of pragmatics and semantic-pragmatics (e.g., Carston, 1998; Chierchia, 2004; Levinson, 2000; Noveck & Sperber, 2007; Sperber & Wilson, 1986). They have also been extensively examined in the context of first language (L1) acquisition (e.g. Guasti et al., 2005; Papafragou & Musolino, 2003; see Crain, 2012 for review). Much of this research shows that children are more logical or conservative than adults, that is, children at young ages are less likely to compute implicatures in contexts where adults naturally do. Details aside, from the whole of this research it seems plausible to conclude: (i) that SIs are computationally difficult for children, (ii) that the results indicate a progressive development of pragmatics throughout early childhood, (iii) that a more mature cognitive capacity is needed for SIs in particular, and (iv) that integration of information at the semantics-pragmatics interface is challenging for children, perhaps due to (iii) or some combination of (i)-(iii). However, the fact that children's performances, even at early ages, depend significantly on the type of experiment employed might indicate that children are better at SIs than some studies show (see Crain, 2012 for discussion).

While SIs are well studied in child L1 acquisition, there is very little research on the acquisition/computation of SIs by adult second language learners.¹ Nonetheless, we believe there are compelling reasons to examine this property in L2 learners, as pointed out by Lieberman (2009) and Slabakova (2010). Why study SIs in adult second language acquisition? If the reasons offered to explain the apparent delay in L1 acquisition are on the right track, then adult language learners might develop more quickly given that they have a fully developed cognition and universal pragmatics which should be fully available. However, unlike children, adult L2ers begin the process of L2 acquisition with specific linguistic experience. As such, whatever advantages adults might have in computing SIs might be altered by L1 influence, particularly when the L1 and the L2 differ in SI computation related to specific lexical items on the scale. As a result, and given the relative dearth in studies related to L2 acquisition, it is interesting to examine how SIs obtain in adult language acquisition in these cases. The present study on the L2 acquisition of Spanish will not only add a new language pairing, but also is the first in which the lexical items giving rise to implicature readings differ across the languages. Besides acquiring the two lexical determiners in Spanish, which roughly translate to English *some*, there is not much novel acquisition that needs to take place. The learning task for English speakers of L2 Spanish is essentially one of mapping (pragmatically) available interpretations, existing yet mapped differently in the L1, to new L2 lexical material. Unlike the case of Korean and Japanese learners of L2

1. Here we distinguish between acquisition and processing, for the latter there is a more established literature (Breheny, Katsos, & Williams, 2005).

English (Lieberman, 2009; Slabakova, 2010), where each language in the pairs has one lexical item, it is not trivial to ponder whether the existence of two lexical items with intricate mappings, as is the case with Spanish, will result in less success in L2 acquisition.

Furthermore, some linguists have claimed that the most challenging features of a language to process in L2 acquisition lie at the interfaces between linguistic and extra-linguistic modules, the so-called external interfaces. Sorace's (2011) Interface Hypothesis (IH) predicts that L2 learners, even at the most advanced stages of acquisition, will face significant challenges in the processing of properties requiring integration between syntax and (discourse) pragmatics. The idea is that adult L2 acquisition is not fundamentally 'i.e., representationally' different from child acquisition, but rather that issues in real-time processing related to the cognitive demands of cross-modular information integration result in differences in performance related to external interface conditioned properties. Underlying the IH is the robust observation that advanced L2 learners often acquire core linguistic properties to a native-like level (Belletti, Bennati, & Sorace, 2007; Gürel, 2006), while they rarely do so for properties at the so-called external interfaces (although see e.g., Donaldson, 2012; Iverson, Kempchinsky, & Rothman, 2008; Rothman, 2009; Slabakova, Kempchinsky, & Rothman, 2012). If on the right track, the IH might predict that adults will have problems with SIs because SI calculation is, as outlined above, an external interface property. Adult L2ers should perform differently from natives, as has been shown for other external interface properties such as resolution of anaphoric dependencies and pragmatic felicity of pronominal subjects (e.g., Belletti et al., 2007; Sorace & Filiaci, 2006; Gürel, 2006). The present study, therefore, also adds another external interface property to evaluate the IH, which has been called for by several researchers in recent years (e.g. Rothman & Slabakova, 2011; White, 2011; Lardiere, 2011).

2. (Scalar) implicatures

Chierchia and McConnell-Ginet (2000) classify intuitive inferences, including SIs, as types of possible inferential relations between meanings of sentences and places them into several different categories along two distinct axes. For our purposes, only the first axis, from which SIs are derived, is relevant; the second relates to differentiating the discourse status of the implication itself once generated. This first axis defines the type of information that authorizes or licenses the inference. When the truth of sentence X requires the truth of sentence Y, the relationship between X and Y is considered an *entailment*. When the judgment that X implies Y arises from an expectation on the part of the interlocutor(s) and their strategy

for interpreting language, the inference is considered a (conversational) implicature. An entailment is grammaticalized, that is, necessarily inferred by uttering X, whereas an implicature becomes optionally licensed by the presence of X, but delimited by both the discourse and real world knowledge.

As far as implication (implicature) is concerned, it is generally understood that X implies Y if and only if Y is part of what the speaker means by uttering X. In this way, an implicature necessarily represents something the speaker would realistically expect or aim to convey; it is a plausible meaning of the speaker's utterance. Grice (1975) argues that an implicature must be something that a listener can calculate. Much of the research on implicatures has focused on what are called conversational implicatures, which will be the focus of the present study. Conversational implicatures, unlike grammaticalized entailments, can be cancelled, obligatorily in certain contexts or optionally, depending on discourse considerations. In other words, the implied meaning which arises in a conversational implicature can be negated by sentences that follow it in context. Take for example the following sentences:

- (4) Kevin used to ride motorcycles every day.
- (5) Kevin doesn't ride motorcycles every day anymore.

Sentence (4) implies the interpretation in (5). However, if (4) is followed by sentence (6) below, then the implication in (5) is cancelled.

- (6) I wonder if Kevin still rides motorcycles every day.

This ability to be cancelled by a sentence in context is a hallmark not only of implicatures in general but also of scalar implicatures, which we examine in the present study.

Of course, the key characteristic of scalar implicatures is their scalar nature, a construct formalized by Horn (1972). A Horn scale is a scale that ranks a set of lexical items hierarchically in terms of the strength of the information they provide; these scales capture the gradable nature of some implication relations. On a Horn scale, the higher lexical item entails each of the lower lexical items, such as <all, some>, <cold, cool>, <three, two, one>, etc. In each of these examples, if a set of things contains *all* possible members of the set, it also contains *some* members of the set. For example, if something is *cold*, then it is also *cool* or if there are *three* items in a set, then there are also *two* and *one* in that set. When a speaker uses one of these scalar lexical items, the listener must interpret the utterance by computing (or not computing) implicatures as necessary. If a listener hears the scalar item *some* in (7), he/she will likely assume that the speaker meant "some but not all" of the students brought cookies to class.

- (7) Some of the students brought cookies to class.

The listener makes this assumption because he/she is respecting Grice's Quantity Maxim. If the speaker had meant to say that *all* students brought cookies to class, then presumably he/she would have used the higher ranked lexical item *all* instead of the logically possible, but less informative scalar item *some*. This reasonable assumption made by the listener is called a scalar implicature.

While all languages have scalar terms, individual languages differ with respect to the lexical items and their potential mappings onto scalar hierarchies. As we will see in the following section, Spanish has two scalar lexical items '*algunos* and *unos*' that roughly translate to English *some* but are different in their distribution related to SI interpretations.

2.1 Spanish plural indefinites with contrasting properties: *Algunos* and *unos*

Despite having nearly identical meanings and overlapping semantic and pragmatic distribution (Gutiérrez-Rexach, 2001; López Palma, 2007), Spanish SIs *algunos* and *unos* differ with respect to their felicitousness in different pragmatic contexts. Determining how L2 speakers compare to L1 speakers of Spanish in this regard is the principal focus of our study. To be exhaustive, however, it is worth mentioning that *algunos* and *unos* can be further distinguished via their idiosyncratic distributional interactions with verb class, predicate type, and contrastive focus (see Gutiérrez-Rexach, 2001; Laca & Tasmovski, 1996; Vargas-Tokuda, Grinstead, & Gutiérrez-Rexach, 2009; Villalta, 1994), which we considered in the construction of our methodology to avoid potential confounds; further consideration does not factor into the empirical study we present below.

The key relevant difference between *algunos* and *unos* is the ability of each form to combine (or not) with DPs to trigger quantity implicatures. According to the literature, only *algunos*, but not *unos*, straightforwardly triggers a pragmatically enriched "some but not all" quantity implicature (Gutiérrez-Rexach, 2001; Vargas-Tokuda et al., 2009).

- (8) Context – Only three out of four dogs bark at the postman.
- a. *Unos perros ladraron al cartero.*
"Some dogs barked at the postman."
 - b. *Algunos perros ladraron al cartero.*
"Some dogs barked at the postman."

This difference, however, is not always apparent, as evidenced in (8a) and (8b), which are presented here with context. Both quantifiers, when combined with a DP, can mean that some members of a group, in this case some dogs, performed

a given action. Nonetheless, if we examine the (in)felicitousness of each item in partitive and non-partitive contexts, we can see differences with respect to their ability to trigger a quantity implicature.

To enrich the context in which these sentences are presented, imagine that there are four specific dogs together when the postman comes to the door to deliver the mail. When the postman arrives, however, only three of the dogs bark at him. In this partitive context (where not all of the dogs bark), both (8a) and (8b) above are still felicitous. The differences between the two items, as demonstrated below in (9a) and (9b), will only emerge in non-partitive contexts, i.e., when all four dogs in context are barking.

(9) Context – All four dogs bark at the postman.

- a. *Unos perros ladraron al cartero.*
“Some dogs barked at the postman.”
- b. *#Algunos perros ladraron al cartero.*
“Some dogs barked at the postman.”

As shown in (9), only *unos*, which denotes the logical “some and possibly all” interpretation, is felicitous in a context where all members of the set are performing an action. *Algunos*, on the other hand, is not felicitous in such a context because *algunos* triggers a “some but not all” implicature due to its partitive feature (Vargas-Tokuda et al., 2009). Therefore, when a Spanish native speaker hears an utterance like (8b/9b), they should typically interpret the use of the hierarchically lower lexical item *algunos* as meaning that the speaker did not mean that *all dogs* barked. Like other scalar inferences, this scalar implicature associated with *algunos* can be cancelled in certain contexts, such as downward entailing (DE) environments,² for example in conditional (if..., then...) structures, as in (10).

(10) Context – All four dogs bark at the postman.

- a. *Si unos perros ladran al cartero, no puede entregar el correo.*
“If some dogs bark at the postman, he cannot deliver the mail.”
- b. *Si algunos perros ladran al cartero, no puede entregar el correo.*
“If some dogs bark at the postman, he cannot deliver the mail.”

In (10b), the scalar implicature associated with *algunos* is cancelled, meaning that *algunos*, like *unos*, can now take a “some and possibly all” interpretation, despite the fact that it does not co-occur in a partitive NP context.

2. Downward entailing contexts invert the entailment relations from [subset to superset] to [superset to subset]: e.g., *nobody likes fruit (superset) → nobody likes apples (subset)*.

3. Acquisition of scalar implicatures

3.1 Child monolinguals

There is a considerable body of research examining the acquisition and interpretation of SIs in monolingual child acquisition (e.g. Breheny, Katsos, & Williams, 2006; Su, 2013; Guasti et al., 2005; Papafragou & Musolino, 2003; Noveck, 2001), showing that children can be sensitive to the computation and interpretation of scalar inferences. However, they do not *always* have access to such pragmatically enriched interpretations, nor do they spontaneously compute SIs with the same frequency as adult speakers, especially at young ages.

For example, Su (2013) examined Mandarin-speaking children and their ability to (i) calculate SIs and (ii) cancel the implicature in context-specific DE environments. Specifically, the study examined scalar “or”, which is disjunctive in meaning, and its appearance between the two arguments of the universal quantifier *every* in Mandarin. The results of the study showed that children accepted both *or* and *and* in DE environments and upward entailing (UE) environments, lacking the same sensitivity to the entailment patterns of Mandarin-speaking adults. Another study by Papafragou and Musolino (2003) tested child and adult Greek monolinguals and also found that children are largely insensitive to the SI reading. The researchers found that (i) children do not treat all scalar terms alike and (ii) children’s (non)derivation of SI can be linked to the complexity of the experimental manipulation and structures. In other words, a child who can calculate scalar implicatures may show insensitivity to context-dependent information due to the cognitive demands imposed by certain experiments. Consistent with this conclusion is the work of Guasti et al. (2005), which showed that Italian-speaking children as young as seven years of age were able to compute SIs in certain experimental conditions. Like Papafragou and Musolino (2003), Guasti et al. (2005) argue that an experimental design can condition a child’s understanding of certain scalar terms and that such design effects can be ameliorated by enriched instruction.

Available studies involve children at different ages performing different experiments. These studies, while revealing, are not necessarily directly comparable. Nevertheless, one can posit, on the basis of these studies, that young children behave differently than adults in experiments involving the realization of pragmatically enriched interpretations of SIs. In other words, children appear to successfully compute SIs, although not to the same degree as adult speakers, and especially under demanding conditions. This does not necessarily mean that the representations at stake in young children are qualitatively different from that of adults, but rather that something about the demands of certain experiments makes them perform differently. The bottom line, then, is that there is some relevant differences

between young children and adults, although the precise details of those differences are still unclear. While the aforementioned trend is true of young children tested in virtually all languages, Vargas-Tokuda et al.'s (2009) study of monolingual Spanish children stands out in sharp contrast.

Vargas-Tokuda et al. (2009) examined monolingual Spanish-speaking children's (ranging from 4;9 to 6;7) ability to successfully generate the pragmatic implicature associated with *algunos* in addition to their ability to generate the alternative sets associated with the lexico-semantic meaning of *unos*. All participants in this study completed a Truth Value Judgment Task (TVJT) in which they saw various sets of 2, 3 or 4 farm animals (out of a group of 4) jumping over a fence. After seeing the animals jump over the fence, the participants judged the truthfulness of follow-up sentences, which included either *unos* or *algunos*. If children were calculating the "some but not all" SI with *algunos*, they would be expected to reject *algunos* in the 4 out of 4 (4/4) condition while accepting *unos* in both the 4/4 and the 3 out of 4 (3/4) conditions, respectively. Results showed that these children behaved like adults, generating the quantity implicature associated with *algunos*. In other words, participants rejected sentences with *algunos* when 4 of 4 animals jumped while accepting sentences with *algunos* when only 2 or 3 animals did so. The authors' conclusion was that these monolingual children generated the SI associated with *algunos*.

In summary, evidence from L1 acquisition of SIs is somewhat mixed. While most studies show that children are less capable of reliably calculating SIs than adults, research from L1 Spanish acquisition shows that children can pattern with adults in the interpretation of SIs in an experimental setting, at least roughly at the age of 5 and older. In the next subsection, we will briefly outline what research on scalar implicatures in adult L2 acquisition reveals.

3.2 Adult L2 Acquisition

The research on SIs in adult L2 acquisition is extremely limited. However, research from Slabakova (2010) in particular seems to suggest that the relative difficulty of mastering SIs in a given L2 may be related to the complexity of the lexical mapping from the L1 to the L2. When both the L1 and the L2 have equal distributional patterns for the calculation of SIs, as is the case with Korean to English, then the acquisition process should be less difficult.

Slabakova (2010) tested native Korean learners of L2 English on their ability to derive SIs both with and without context. The control groups of English and Korean native speakers were tested in their native language. In Experiment 1, participants read sentences such as (11) and (12) below and then either agreed or disagreed with them.

- (11) Some elephants have trunks.
- (12) Some books have color pictures.

The critical items in this experiment were the sentences like (11), which, while logically true, are also pragmatically infelicitous. If participants reject sentences like (11), it is an indication that they are acting *pragmatically* and calculating a “some but not all” SI. If participants accept such sentences, on the other hand, it suggests that they are acting *logically* in the evaluation of these sentences. Surprisingly, results showed that L2 learners acted more pragmatically than both the monolingual English and monolingual Korean control groups. In other words, they rejected sentences like (11) more than either of these groups. Experiment 2, unlike Experiment 1, provided participants with contextualized sentences with which to agree or disagree. Results from Experiment 2 indicated, once again, that L2 learners were behaving more pragmatically than the monolingual control groups. Slabakova (2010) posits that SIs “present no problem to L2 learners” (p. 2444), probably because SIs are presumed to involve universal pragmatic principles (see also Dekydstpotter & Hathorn, 2005).

Slabakova (2010) showed that L2 learners do not have difficulty deriving implicatures in an L2 when only one lexical item (*some*) is involved in the SIs of interest. However, a pilot study examining the L2 acquisition of Spanish SIs seems to indicate that the addition of a second lexical item (*algunos* and *unos*) may make the learning experiment significantly more difficult for L2 learners. Vargas-Tokuda et al. (2009), in the conclusion section of the study presented in section 4.1, discuss in brief the results from a pilot study of advanced L2 Spanish learners’ knowledge. It should be noted that no details or numbers are given in that paper, just the descriptive, holistic reporting of trends of the distinction between *algunos* and *unos*. Unlike the L2 learners in Slabakova’s (2010) study, the L2 learners in Vargas-Tokuda et al.’s (2009) pilot study seemed to be “utterly unaware” (p. 114) of the distinction between the two existential determiners in Spanish. Based on this preliminary finding, we predict our learners to be less successful than those of Slabakova (2010), which would support the generalizability of her claims for L2 acquisition. Given the wealth of research into L2 pragmatics and the seemingly contradictory findings of these two studies, further inquiry into the L2 acquisition of Spanish SIs is warranted and potentially illustrative on several planes. Furthermore, because SIs are a property at the semantics-pragmatics interface, it also presents a relatively novel property for testing the predictions of Sorace’s Interface Hypothesis (2011).

4. The present study

4.1 Research questions and hypotheses

Below, we present the research question that forms the basis of the empirical study. Following this question, we offer our predictions for behavior.

Are adult, near-native L2 Spanish speakers sensitive to the subtle distributional difference between *algunos* and *unos* in Spanish? Specifically, do they calculate the “some but not all” SI associated with the Spanish indefinite determiner *algunos*? If so, do they differ from the controls?

The results from Slabakova’s (2010) study have multiple implications. First, her data suggest that L2 learners might in general have little difficulty calculating SIs and canceling them in appropriate contexts in the L2 because this process involves universal pragmatics. Second, because her learners showed successful acquisition of a native-like knowledge of implicature calculation, an external interface property, the results provide counterevidence to the IH. However, there is at least one additional reason why we might predict that English learners of L2 Spanish would have difficulty with this property. The fact that Spanish has multiple lexical items that roughly equate to English *some* adds a level of complexity that may present further challenges to the present L2ers’ performance that did not apply to the Korean learners of English in Slabakova (2010).

4.2 Methodology

In this section, we present information on the subject participants, as well as the experiment used to gauge speakers’ knowledge of how SIs work in Spanish as it relates to their distribution with the scalar terms *algunos* and *unos*.

4.2.1 Participants

There are two participant groups in the study: (i) a near-native L2 group ($n = 26$) and a native Spanish control group consisting of 21 late L2 learners of English. The L2 group participants spoke English as a native language and began learning Spanish at age 10 or later. Participants’ proficiency in Spanish was established based on their scores on an abbreviated, 50-question version of the Diploma de Espanol como Lengua Extranjera (DELE), standardly used as a measure of proficiency in the field (e.g., Bruhn de Garavito & Valenzuela 2008; Slabakova et al., 2012; Slabakova & Montrul, 2003; White et al. 2004). All L2 participants scored between 43–50 (with a mean of 46.3), a range that has been categorized by the aforementioned studies as near native proficiency. Moreover, all participants had

spent time in naturalistic, Spanish-speaking environments, e.g., extensive mission trips (2 years), study abroad programs, and service learning programs, as well as foreign employment. All L2 participants in this group were graduate, post-graduate or other professionals (mean age = 26.5) with classroom exposure to Spanish.

As mentioned, a bilingual control group consisting of 21 native Spanish speakers from various Spanish-speaking countries living inside the US completed the same experimental tasks. Every member of the control group scored 45 or higher on the proficiency exam (range = 45–50; mean = 47.6) and reported Spanish as their dominant language. Though Spanish was reported as their dominant language, all are highly proficient speakers of English who had spent at least 8 years in the US at the time of testing. All participants came to the US after the age of 15 (mean = 33.2). The choice of a bilingual control was purposeful, the idea being that comparing sets of bilinguals to each other is the fairest comparison to tease apart any possible effect of bilingualism that can obscure results between bilinguals and monolinguals (see e.g. Rothman & Iverson, 2010; Hopp & Schmid, 2013). The crucial difference between the two groups then, since they are matched for holistic grammatical proficiency, is the native versus additional language status of their Spanish, as determined by the age and context of the acquisition process.

4.2.2 *Materials*

4.2.2.1 *Language background questionnaire.* Participants filled out a short language background questionnaire containing pertinent information as to when and where the L1/L2 was first learned and in what context. In addition, the questionnaire also asked participants to self-evaluate their own language dominance in both Spanish and English. L2 participants who had begun learning Spanish before age 10 were excluded from the study, as were participants who had at least one Spanish-speaking parent.

4.2.2.2 *Truth-value video acceptability experiment.* The goal of Experiment 1 was to evaluate whether L2 learners calculated the ‘some but not all’ SI associated with *algunos*. The methodology for the present experiment was modeled after the study by Vargas-Tokuda et al. (2009). Participants watched 48 short video clips in which four characters, who were presented to the participants in a pre-experiment context, performed various activities. In each video, 0, 3, or 4 of the four characters completed a given action, e.g., going upstairs or exiting a building. After each video, participants were presented with a summary sentence which included either (a) *algunos*, (b) *unos*, (c) *alguien* (‘someone’), or (d) *nadie* (‘no one’) (See Table 1 for a summary of the experimental items broken down by context (number of people completing the action) and scalar term (*unos* or *algunos*)).

Table 1. Breakdown of Experimental Items by Context and Scalar term

	4 of 4	3 of 4	0 of 4	Total
<i>Unos</i>	Felicitous <i>n</i> = 4	Felicitous <i>n</i> = 4	Infelicitous <i>n</i> = 4	Felicitous <i>n</i> = 8 Infelicitous <i>n</i> = 4
<i>Algunos</i>	Infelicitous <i>n</i> = 4	Felicitous <i>n</i> = 4	Infelicitous <i>n</i> = 4	Felicitous <i>n</i> = 4 Infelicitous <i>n</i> = 8
<i>Nadie</i>	Infelicitous <i>n</i> = 4	Infelicitous <i>n</i> = 4	Felicitous <i>n</i> = 4	Felicitous <i>n</i> = 4 Infelicitous <i>n</i> = 8
<i>Alguien</i>	Felicitous <i>n</i> = 4	Felicitous <i>n</i> = 4	Infelicitous <i>n</i> = 4	Felicitous <i>n</i> = 8 Infelicitous <i>n</i> = 4
Total				<i>n</i> = 48

The sentences with *alguien* and *nadie* served as fillers and as such will not be analyzed in the remainder of the present study. Of the three contexts, 4/4 and 3/4 serve as the experiment targets and 0/4 serves as the control condition. After watching each video, participants were asked to judge the truth value of the summary sentence according to what they saw (see Figure 1). If participants were calculating the SI associated with *algunos*, we could expect to see the following two trends.

6. Algunos hombres bajaron las escaleras. *

- ☐ Acceptable
- ☐ Unacceptable

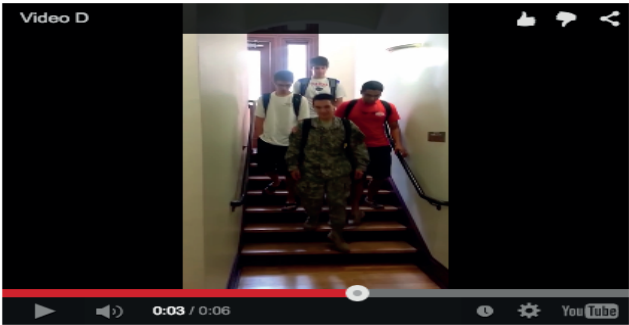


Figure 1. Example Item from Experiment 1: 4 out of 4 Condition with *Algunos*

First, participants should accept *algunos* significantly more in 3/4 versus 4/4 conditions. Second, participants should show a significantly higher acceptance of *unos* versus *algunos* in the 4/4 condition. In the control condition, we expect ceiling performances by both groups since the contexts relative to the scalar/target term presents no possible semantic ambiguity.

5. Results

The results of the experiment are first presented descriptively and then followed by a detailed statistical analysis.

Truth-value percent acceptance of the summary sentence in each of the relevant video conditions, two experimental, one control, is presented in Figure 2 below. We see that the control conditions, *algunos* and *unos* in 0 out of 4 contexts, are all rejected, confirming (i) that participants do not accept *algunos* and *unos* when no one performs an action and (ii) that the experimental design works.

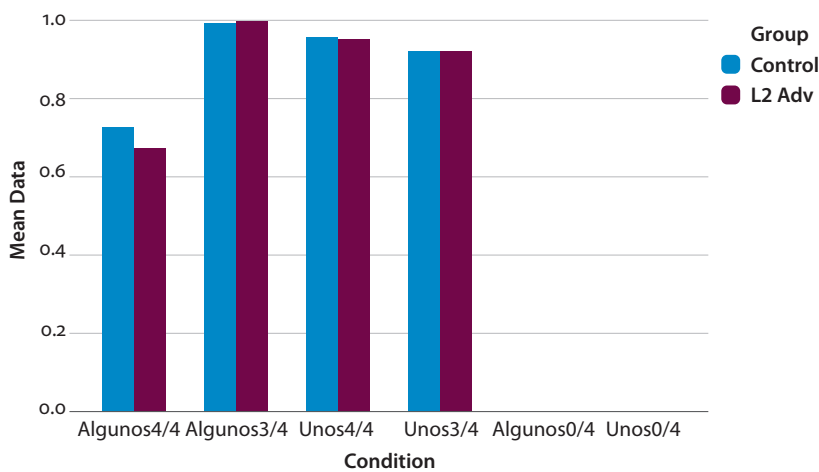


Figure 2. Percent acceptance in Experiment 1

Recall that participants who compute the SI for *algunos* are expected to make two key distinctions, precisely because *algunos* has a partitive reading. First, they should accept *algunos* in the 3/4 conditions significantly more than they do in the 4/4 conditions. Second, they should accept *unos* in the 4/4 conditions significantly more than they accept *algunos* in the 4/4 conditions. As we can see in Figure 2, the native control group makes both distinctions, in line with the descriptions of Spanish in the theoretical literature. These distinctions are also observed in the judgments of the L2 group.

The control group accepted *algunos* in the 4/4 conditions 74% of the time, compared to 99% acceptance in the 3/4 conditions. Their 99% acceptance of *unos* in the 4/4 conditions was also considerably higher than their acceptance of *algunos* in the 4/4 conditions. The L2 group makes the same qualitative distinctions. Specifically, they accepted *algunos* 99% of the time in the 3/4 conditions, compared to 68% in the 4/4 conditions. This pattern is comparable to the pattern exhibited by the controls. Similarly, the L2 group also showed a higher acceptance for *unos* in the 4 of 4 conditions (95% compared to *algunos* (68%), once again patterning with the performance of the control group.

5.1 Statistical models

In order to examine whether the two experimental groups differentiated between the four conditions in similar ways, the data were analyzed using a mixed-effects logistic regression model and pairwise contrasts with Bonferroni correction when appropriate. The dependent variable for the experiment, as detailed above, was percent acceptance, and the threshold for statistical significance was set at $p \leq .05$.

The statistical model included variables of Group, Word (*algunos* vs. *unos*), Number (4/4 vs. 3/4), and all higher-order interactions of these variables. The random effects structure was the maximal structure supported by the data (see e.g. Barr, Levy, Scheepers, & Tily, 2013), and included random by-subjects intercepts and slopes.

There was a significant interaction of Word*Number ($F(1, 202) = 10.706$; $p = .001$), and a significant effect of Number ($F(1, 204) = 7.277$; $p = .007$); all other interactions and variables were not significant. A further examination of the Word*Number interaction revealed that the distinction in acceptability of items with *algunos* versus items with *unos* was only significant in numerical contexts referring to 4/4 group members (i.e. *unos* was markedly more acceptable, $p = .006$). Additionally, a sensitivity to number of entities referred to (3 or 4 out of 4) was only present in video clips with *algunos*: clips presenting only three group members out of four were significantly more acceptable than those referring to all four group members ($p = .003$).

Considering these comparisons as a whole, some important trends can be noted. First, the two groups do not differ significantly in their acceptance of the test items. Both groups calculate the SI where contextually appropriate. Second, the groups' performance is consistent with claims in the literature: the acceptability of *algunos* referring to partitive and whole groups is differentially affected by the pragmatic environment. The combination of these observations suggests that both groups have similar, native-like knowledge of the pragmatic implicatures carried by *algunos*, as well as the purely semantic nature of *unos*.

6. Discussion

The present study proposed one specific research question: can L2 learners be native-like in the domain of scalar implicature calculation in Spanish? The answer to this question, as supported by the data, seems to be “yes.” The relevance of this question is several-fold. First, as we have discussed, there are very few studies that have examined SIs in an L2 context. This study, therefore, makes a contribution to an understudied domain in L2 acquisition, specifically SIs and, more generally, the semantic-pragmatics interface. Of the few studies that have examined SIs in L2 acquisition, none, to our knowledge, examined a language pairing that presents the same formal learning task as the one facing English learners of Spanish. Recall that Spanish has two lexical items that roughly translate to the English scalar term *some*, yet only one of them allows for SI calculation. The semantics implicated here are taken to be universal, and so the learning task involves the mappings of universal semantics to grammar-specific constraints on particular lexical items.

One result of note is that the behavior of the native speakers does not unequivocally support the expectations from the literature. The control group does not reject *algunos* in the 4/4 contexts with anything like categorical evaluations of unacceptability. True, they make two statistically significant contrasts as we pointed out above, but the judgments remain subtle (see also Syrett et al., 2016, for similar findings with Spanish-English bilingual speakers). This finding on its own suggests that the acquisition task of the L2 learners is going to be based on precarious and perhaps inconsistent evidence (i.e. linguistic input). Next, and unlike in the case of Korean learners of L2 English described in Slabakova (2010), we hypothesized that English learners of L2 Spanish might find it a more formidable task to converge on the SI constraints in Spanish due to the complexities of the lexical distribution. In fact, we thought that since Spanish has two lexical items roughly equivalent to English *some*, an economical way of distributing the SI and non-SI meanings might be to converge on a system in which there is a faithful 1:1 mapping. In other words, L2 learners could have mapped one meaning to *algunos* and the other to *unos*. Given positive evidence in the input that *algunos* is discourse-linked, we might expect that L2ers would map the SI strictly to *algunos*, leaving the other, non-partitive meaning for *unos*. If this were the case, we would expect the L2 learners to prefer *algunos* in partitive versus non-partitive contexts, as presented above in section 5. However, if L2 learners were relying on such a 1:1 mapping strategy, we would also expect them to be significantly less accepting of *unos* in partitive contexts, since this lexical item would presumably only carry the remaining “some and possibly all” reading. Given that the L2 learners are equally accepting of *unos* in both partitive and non-partitive contexts, it is clear that they are not resorting to such a simple, 1:1 mapping strategy. Instead, they appear to

have converged on a non-linear, and truly native-like system in which the distribution of *unos* and *algunos* is asymmetrical in nature: while *algunos* is less acceptable for the L2ers in non-partitive contexts, *unos* remains equally acceptable regardless of the context.

While the L2 group data presents a clear, native-like tendency to accept *algunos* at a lower rate in non-partitive contexts, individual data complicate the story. Only eight of the 25 L2 learners (32%) reject *algunos* more than 25% of the time in the 4/4 context, which would be the expected judgment based on the literature. At face value, this finding suggests that only a small subset of the L2 learners behave in a native-like manner. However, we feel that such a conclusion is not warranted for two main reasons. First, only 7 of the 21 bilingual controls (33%) reject *algunos* more than 25% of the time in the 4/4 context, showing a remarkably similar distribution to that of the L2 learners. Second, the variability of the L2 learner group appears to be highly constrained in a qualitatively target-like manner. Of the 17 L2 learners who did *not* reject non-partitive *algunos*, only 3 showed qualitatively non-target-like preferences (i.e., rating *algunos* in the 4/4 context higher than (a) *algunos* in the 3/4 context or (b) *unos* in the 4/4 context). The remaining 14 L2 learners demonstrated the same response patterns as the 14 bilingual controls who did not reject *algunos* in non-partitive contexts. Considering the variability in the responses of the bilingual controls, who likely represent providers of the type of input relevant for SI mappings that L2 learners receive, the L2ers' constrained and target-like response patterns seem especially impressive.

When we consider the results of the present study alongside previous studies of L2 acquisition of SIs, it seems clear that SIs do not present a particular challenge for second language learners, regardless of (a) the language pairing studied and (b) the complexity of the distribution of lexical items. After all, Korean and Japanese learners of English (Lieberman, 2009; Slabakova, 2010) and English learners of Spanish appear to successfully acquire SIs in the L2. Since these studies comprise the whole of the L2 literature on SIs up to this point, this conclusion remains, at present, unchallenged. These findings appear to constitute significant evidence against the Interface Hypothesis (Sorace, 2011), which predicts that there should be some detectable difference between the L2 learners and the controls in the domain of external interface properties, such as the calculation of SIs. After all, the L2 group in the present study performs quantitatively and qualitatively like the control group with SIs in Spanish, despite the additional difficulty of (asymmetrically) mapping SI and non-SI readings to two different lexical items.

To be fair, however, it is not entirely clear that our data straightforwardly represent counterevidence to the claims of the IH. Consider the actual profile of our native controls. We purposefully chose *bilinguals* who are natives of Spanish and Spanish-dominant for reasons of maximal comparability with the L2 learners.

However, the IH's claims also predict that SI computation would be a *prima facie* domain for attrition to take place in the grammars of these bilingual controls. What we do not know, because our control group is not monolingual, is whether or not the present native control data reflects a state that has already undergone a change. To adjudicate whether or not the IH is really challenged by the present results, one would ideally include a monolingual native control group in order to determine whether (a) the bilingual controls have shown any sign of attrition and (b) whether the L2 group has performed in a truly different manner from non-bilingual controls. It should be noted that if (a) is shown to be the case via a comparison to monolingual natives, this would not necessarily represent evidence in favor of the IH. The fact would still remain that L2 learners in the US are primarily exposed to Spanish as it is realized in the US. Although Spanish is a minority language, it is considerably present in the United States (roughly 50 million native speakers, US Census 2011) and people of the type we tested in the L2 group have primarily been exposed to Spanish that is either from other successful L2 learners or natives of the bilingual type that constitute our bilingual control. In other words, if the L2 learners in the study were to perform more similarly to the bilingual controls than to the monolingual controls, this may be the result of exposure to US bilingual Spanish input, which is itself the consequence of linguistic contact. Insights into the above discussion, however, come from an in-progress extension of the present study where we are collecting data from a monolingual group. Early returns suggest that L2 learners converge not only with bilingual but also monolingual control groups, which also means that the bilingual and monolingual control groups do not differ at this point. Coupled together, these preliminary data seem to challenge the predictions of the Interface Hypothesis.

7. Conclusion

Examining properties such as SIs in adult L2 acquisition can contribute to L2 acquisition theory. The disproportionate amount of research investigating SIs in (child/adult) monolinguals, for example, offers little to no explanation as to how or if pragmatically sensitive information is acquired by adult L2 learners to the same degree as it is by monolinguals. Such shortage of L2 literature in this domain warranted further examination of SIs and their relationship to existing theories of L2 acquisition. Regarding the calculation of SIs, our results indicate (i) that L2 learners are able to converge on a system where they map universal semantic meanings onto two newly acquired lexical items in a non-linear way, with no differences between their system and the native controls, irrespective of the fact that English is different in this way, and (ii) that linguistic properties that lie at external

interfaces, at least not all to the same degree, are equally challenging to L2 learners as some theories have suggested. One such theory, the Interface Hypothesis (IH) (Sorace, 2011), makes distinct claims as to how L2 learners fare in learning tasks at the external interfaces, such as the semantics-pragmatics interface. According to the IH, issues in real-time processing are related to the cognitive demands of cross-modular integration of information. These cognitive demands ultimately result in differences in performance related to external interface conditioned properties such as SIs. The present study, therefore, adds another property to evaluate the IH, which has been called for by several researchers in recent years (Rothman & Slabakova, 2011; White, 2011; Lardiere, 2011).

In summary, advanced L2 learners can acquire subtle context-driven and language-particular linguistic properties, indicating they have similar access to universal pragmatics as they do to other grammar internal domains such as syntax semantics, and can overcome any added processing complexities inherent to external interfaces, contrary to the Interface Hypothesis as proposed by Sorace (2011).

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