

Knowledge of Wh-movement in Spanish L2 Learners and Heritage Speakers

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1. Introduction

The study of language contact from a linguistic perspective is concerned with the process and outcome of any situation in which two or more languages come into contact, with particular emphasis on conditions that constrain the changes that grammatical systems undergo. Potential linguistic changes are described both at the levels of individual speakers and across generations of speakers at the societal level. After all, language change at the societal level is driven by language change at the individual level.

One of the linguistic and psycholinguistic processes that characterizes several outcomes of bilingualism is transfer or cross linguistic influence. Transfer is very common in both developing and fossilized endstate second language grammars (Lardiere 2007, Franceschina 2005, Schwartz & Sprouse 1996). Transfer effects have also been observed in the patterns of attrition and incomplete acquisition of a first language in a language contact situation, including the case of ethnic-minority bilingual speakers who are dominant in the majority language. In these particular cases, the majority language (the L2) becomes the psycholinguistically and functionally stronger language and may encroach on the structure of the heritage language (the L1).

The purpose of this study is to compare the linguistic system of two types of adult bilinguals—L2 learners, or late bilinguals, and heritage speakers, or early bilinguals—who have incomplete knowledge of Spanish, either because they are in the process of learning the language (L2 acquisition) or because their first language failed to be developed completely or underwent attrition in childhood (many cases of heritage language acquisition). It has been amply documented in generative second language research that L1 transfer is stronger at the earliest stages of L2 development, when knowledge of the second language is weakest (Schwartz & Sprouse 1996). We ask whether dominant language (L2) transfer has the same effects on the L1 of heritage speakers, and we examine this question by focusing on the effects of English, the stronger language as L1 and L2, on Spanish, the weaker language as L1 or L2. The two types of bilinguals studied, however, differ on age of onset of bilingualism. Since robust transfer effects are very common in incipient L2 acquisition by late learners, we further ask whether similar transfer effects will be observed in individuals who acquired the weaker language early in childhood (early learners) and have lived, since then, in a language contact situation.

Age is an important factor in second language acquisition explicit in many theories of L2 competence which ascribe to a representational deficit view of second language acquisition (Bley-Vroman 1990, Clahsen & Muysken 1989, Hawkins & Chan 1997, Hawkins & Hattori 2006, Meisel 1997, Schachter 1990). According to this position, the L1 has a deterministic role in L2 acquisition and ultimate attainment. L2 learners cannot reset parameters or acquire features not selected by their L1 in early childhood, due to some sort of maturational effect. If we assume this position and extend it to the outcome of early bilingual development, then a possibility is that dominant language transfer effects might be weaker in early bilinguals (with onset of bilingualism in childhood) than in late bilinguals or L2 learners (with onset of bilingualism past puberty), especially in grammatical domains that are acquired before the age of 4. Recent research comparing these two types of bilinguals suggests that early bilinguals have linguistic advantages over late bilinguals in some domains and tasks (phonology and pronunciation) but not in morphosyntax (Au *et al.* 2002, Knightly *et al.* 2003), although other recent studies question these conclusions about morphosyntax (Montrul 2005, Montrul *et al.* 2006). In

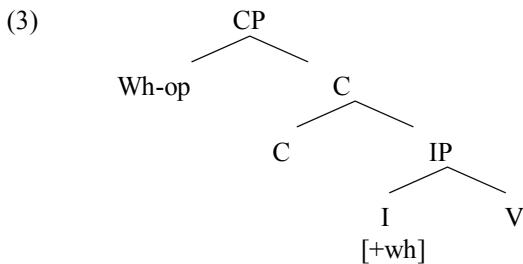
this study, we focus on syntax and investigate knowledge of wh-movement in Spanish questions in early and late bilinguals.

2. Wh-movement

Spanish and English obey the Subjacency Principle and have overt wh-movement in questions (and relative clauses). In questions, a wh-phrase is fronted to clause initial position. Spanish, however, exhibits obligatory subject-verb inversion in clauses where the wh-phrase has been extracted from an object position, as shown in (1). This inversion is similar, although not identical, to auxiliary verb inversion in English (Zagona 2002). Like in English, object extraction from an adjunct island is ungrammatical, as shown in (2).

- (1) a. ¿Qué compró Juan en la tienda? cf. ¿*Qué Juan compró en la tienda?
 b. What did John buy at the store?
- (2) a. ¿*A quién habló José con María después de ver?
 b. *Who did Joe speak with Mary after seeing?

Wh-movement involves movement of the wh-phrase to the specifier of CP. Movement is motivated to satisfy some agreement relation. According to Rizzi (1996), the order of wh-phrases and the verb follow from the Wh-criterion, a universal constraint on question formation that may be satisfied overtly or covertly.¹ The conditions for the Wh-criterion are met if a wh-phrase is in the spec of a CP projection and a [+wh] head is in C (a complementizer), as in (3). In English, Spanish and Italian the [+wh] feature is in Infl, and the verb must then move from I to C to satisfy the Wh-criterion. However, unlike English, Spanish has the option of leaving the subject in postverbal position or the option of moving it to a left dislocated position. Thus, I-to-C movement combined with the availability of a postverbal subject position in Spanish yield subject-verb inversion in questions like (1).



One difference between Spanish and English addressed in this study is related to the possibility of having (or not) an overtly expressed complementizer. In Spanish, the complementizer *que* is typically obligatory, while in English the complementizer *that* is optional with some verbs in embedded complement clauses.

- (4) a. María dijo que ella es de Colombia. cf. *Maria dijo ella es de Colombia.
 b. Maria said (that) she is from Colombia.

While the optionality of English *that* in embedded complement clauses may be determined by the semantics of the verb (e.g., *claim* vs. *whisper*), in other clauses the presence of an overt complementizer is ungrammatical. This represents another important grammatical contrast between Spanish and English. In Spanish, it is possible to extract a subject from an embedded clause when

¹ Wh-criterion

A Wh-operator must be in a Spec-head configuration with X^o [+wh].

An X^o [+wh] must be in a Spec-head configuration with a Wh-operator.

there is a trace in subject position, while English does not allow a wh-trace in subject position to follow an overt complementizer. Therefore, we see the grammatical contrast between (5a) and (5b).

- (5) a. ¿Quién_i piensa María que t_i es de Argentina?
 b. *Who_i does Mary think that t_i is from Argentina?

This is the *that-t* effect (Chomsky & Lasnik 1977, Chomsky 1986, Rizzi 1986, 1990), which has been argued to be related to the different inflectional and null subject properties of the two languages. Rizzi (1982) made the specific claim that in null subject languages like Spanish and Italian, subjects can freely appear in postverbal position inside VP. By extracting the subject from the postverbal position and not going through the spec IP position, the trace can satisfy the Empty Category Principle (ECP). Since non null subject languages like English lack the free-inversion postverbal position, the subject is forced to go through the preverbal subject position giving rise to *that-t* effects. It is important to note, however, that subsequent advances in empirical coverage and syntactic theorizing have put into question both the status of *that-t* in the grammar and Rizzi's original analysis (Nicolis 2006, Zhuang 2006), but these specific details are not crucial for the purposes of this study.

In sum, both English and Spanish have overt wh-movement in questions and obey Subjacency. However, the two languages vary with respect to the availability of free subject inversion and complementizer omission. The presence of lexically filled complementizers has consequences for the grammaticality of wh-extractions from embedded subjects.

3. The Study

3.1 Hypotheses

If contact with English affects knowledge and representation of aspects of the Spanish grammatical system in bilinguals whose dominant language is English, then their Spanish grammars may display properties of English. Since constraints on wh-movement are very similar in the two languages, the encroachment of English into Spanish can only be assessed in structures that differ slightly in the two languages, as in the case of complementizers and embedded sentences with subject extractions. If there is transfer in this grammatical domain, bilinguals may accept sentences with no complementizer, as in English, and reject sentences with subject extraction due to the obligatory presence of the complementizer in Spanish. However, degree of transfer may vary depending on level of proficiency and age of onset of bilingualism. In the context of L2 theories that regard age of acquisition as an obstacle for successful L2 acquisition in late learners, transfer from English will be more pronounced in late bilinguals than in early bilinguals on the one hand, and in speakers of lower than of more advanced proficiency in Spanish, on the other.

3.2 Participants

A total of 155 adult participants took part in the experiment. These were divided into three main groups. The first group was the control group ($n = 22$), which consisted of native speakers of Spanish from Spain, Argentina and Mexico. Half of the participants were tested in the United States and the other half were recruited and tested abroad, in their countries of origin. The second group consisted of 70 English-speaking L2 learners of Spanish enrolled in beginner to advanced Spanish language classes at a research university in the United States. All started first exposure and instruction in Spanish in high school and college, after age 14. Mean age at the time of testing was 22.5 years old. Finally, the third group consisted of 67 Spanish heritage speakers. All came from Mexican families, were born and schooled in the United States, and were exposed to Spanish at home since birth (to different degrees). All were English-dominant college students (mean age 23.8) and some of them were taking different levels of Spanish language classes at the same university. Due to the different onset of acquisition of Spanish, L2 learners are late bilinguals while the heritage speakers are early bilinguals.

3.3 Instruments

All participants took parts of a Spanish proficiency test, to establish their level of proficiency in the language and to match L2 learners and heritage speakers. The proficiency test focused on vocabulary and grammar. The maximum number of points on this test was 50. The main instrument was a web-based off-line grammaticality judgment task. The GJT included a total of 50 sentences (25 grammatical and 25 ungrammatical), of which 30 were target sentences and the other 20 were distractors. The six target sentence types tested are illustrated in Table 1. There were 5 tokens per type.

Table 1. Target sentence types.

Grammatical	
Object extraction	¿Qué va a comprar Juan en la tienda?
Embedded object extraction	¿Qué pensó José que María regaló?
Embedded subject extraction	¿Quién dijo Ana que rompió la puerta?
Ungrammatical	
No inversion	*¿Qué Juan compró en la tienda?
Adjunct island	*¿A quién habló José con María después de ver?
No complementizer	*Juan dijo él vendría ahora mismo.

The sentences were presented in a randomized order. Each sentence was followed by a 5-point Likert scale, which allowed participants to express different levels of acceptability (1 = incorrect, 2 = somewhat incorrect, 3 = unsure, 4 = somewhat correct, 5 = correct), as illustrated in (5) and (6). Participants were instructed to use the “3” response only when they had no judgment on a given sentence.

(5) ¿Qué va a comprar Juan en la tienda?

1 2 3 4 5

(6) ¿Qué Juan compró en la tienda?

1 2 3 4 5

3.4 Results

3.4.1 Proficiency

Overall results of the proficiency test showed that the native speakers scored above 95% accuracy (mean 48.77), while the L2 learners and the heritage speakers scored below 70% accuracy (mean heritage speakers 34.29 and mean L2 learners 34.61). A one-way ANOVA showed a statistically significant difference between the scores of the native speakers and those of the two bilingual groups ($F(2,152) = 34.034, p < .0001$), but no difference between the L2 learners and the heritage speakers. The two bilingual groups were further subdivided into three proficiency groups: low, intermediate and advanced. Mean and standard deviations are shown in Table 2. A one-way ANOVA revealed significant differences between the scores of the native speakers and those of the three proficiency groups. Once the two bilingual groups are matched for proficiency, if differences between L2 learners and heritage speakers are observed in the main task, we can assess more directly whether differences are due to age of onset of acquisition of Spanish instead.

Table 2. Mean and Standard Deviations for Proficiency Scores (maximum 50)

	<i>Control</i> (<i>n</i> =22)	<i>Heritage Speakers</i> (<i>n</i> =63)	<i>L2 Learners</i> (<i>n</i> = 70)
Overall	48.77 (.65)	34.29 (.42)	34.61 (.39)
Advanced (<i>n</i> =47)		45.55 (.57)	46.27 (.72)
Intermediate (<i>n</i> =39)		34.69 (.64)	34.46 (.76)
Low (<i>n</i> =47)		24.63 (.92)	23.00 (.51)

3.4.2 Grammaticality Judgment Task

The numerical responses assigned to the sentences in the grammaticality judgment task were analyzed through a factorial ANOVA with repeated measures, with acceptability score as the dependent variable and grammaticality, sentence type, group, and proficiency level as the independent variables. All “3” scores were removed from the data analysis. This affected 4.7% of the L2 learners’ data and 3.9% of the heritage speakers’ data. The control group was only included in the overall group analyses. The proficiency analysis focused on the L2 learners and the heritage speakers, excluding the control group. The statistical results showed main effects at the $p < 0.01$ level for grammaticality, sentences, and proficiency level, but no main effect by group ($F(1,148) = 1.369, p < .244$). Other significant interactions were grammaticality by level, sentence by group, sentence by level, grammaticality by sentence, and grammaticality by sentence by proficiency level. We will now illustrate some of these effects.

Figure 1 shows the results of grammaticality by group. As the statistical results confirmed, all groups distinguished reliably between grammatical and ungrammatical sentences, and while there was a significant difference between the control group and the bilingual groups, crucially, the bilingual groups—L2 learners and heritage speakers—were no different from each other, hence the non-significant group effect when the control group was excluded from the analysis.

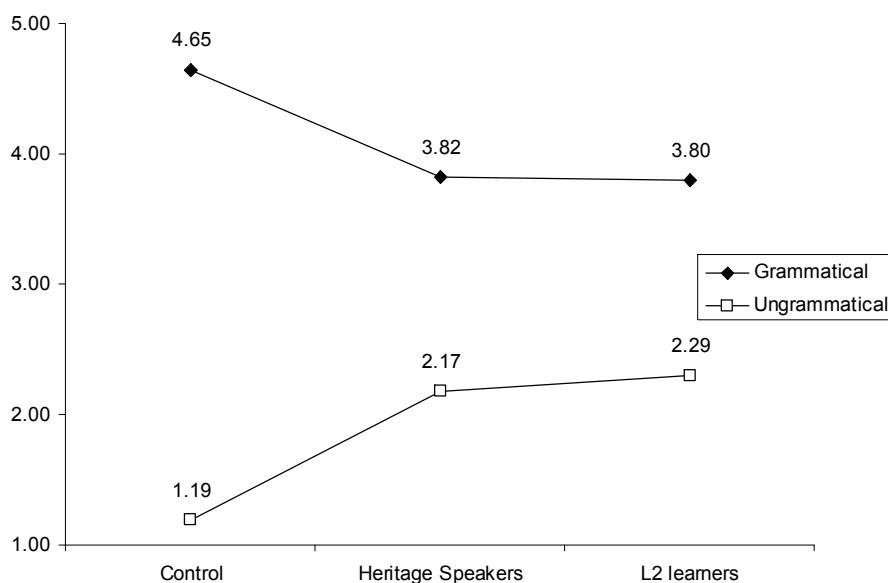


Figure 1. Overall acceptability scores by grammaticality and group.

Figure 2 shows the interaction of grammaticality with proficiency level. All proficiency groups accepted grammatical sentences and rejected, or showed tendency to accept less, ungrammatical

sentences, as confirmed by the statistical result. While there were no differences between advanced, intermediate and low level bilinguals in their acceptance of grammatical sentences, the results of the ungrammatical sentences showed statistically significant discrimination among proficiency groups. Thus, following a normal developmental trend, the advanced bilinguals showed lower rates of acceptance of ungrammatical sentences than the low proficiency speakers, regardless of group.

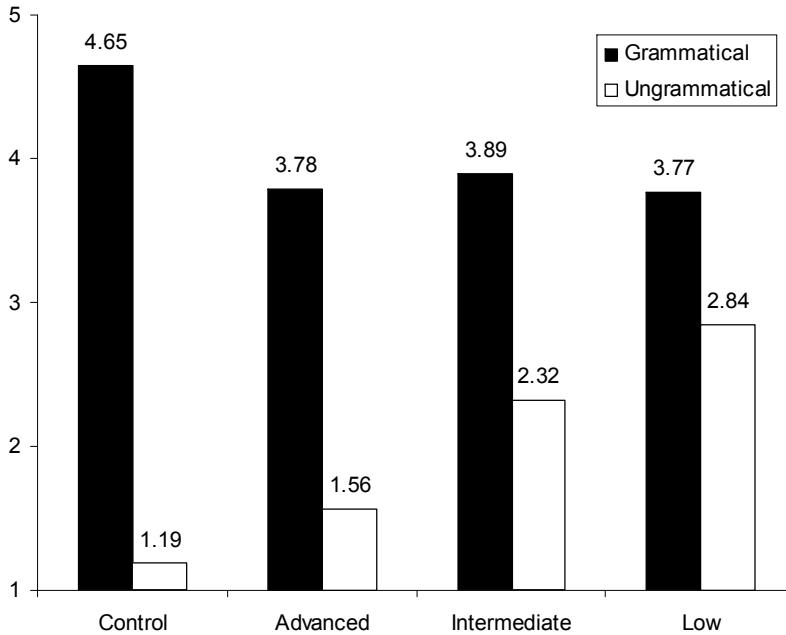


Figure 2. Grammaticality judgments by proficiency level.

Figure 3 shows the results of sentences with object extractions and inversion, such as *¿Qué compró Juan en la tienda?* (What did John buy in the store?), which are grammatical in Spanish and English. Results showed no statistically significant difference by group or level and no interactions.

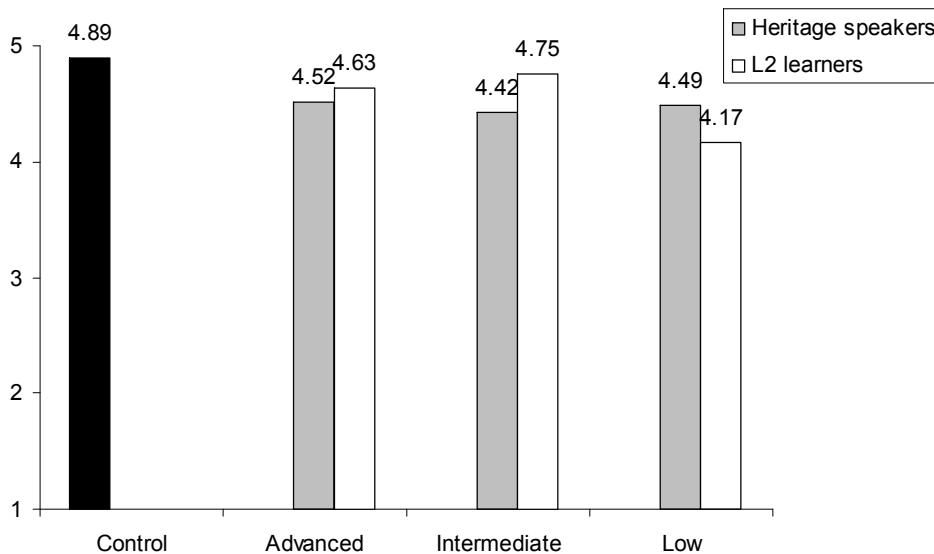


Figure 3. Mean acceptability judgments on sentences with object extractions (with inversion).

Figure 4 displays results on sentences with object extraction but without inversion, such as *¿*Qué Juan compró en la tienda?* (What John bought in the store?). These sentences are ungrammatical in Spanish and English. While at the group level, results of L2 learners ($M = 1.35$, $SD = 0.72$) and heritage speakers ($M = 1.60$, $SD = 0.78$) did not differ from each other, they differed by proficiency level. The low level speakers assigned statistically higher ratings ($M = 2.03$, $SD = 1.11$) than the advanced speakers ($M = 1.27$, $SD = 0.49$) and the intermediate speakers ($M = 1.65$, $SD = 0.80$) ($F = (2, 152) = 8.503$, $p < 0.0001$).

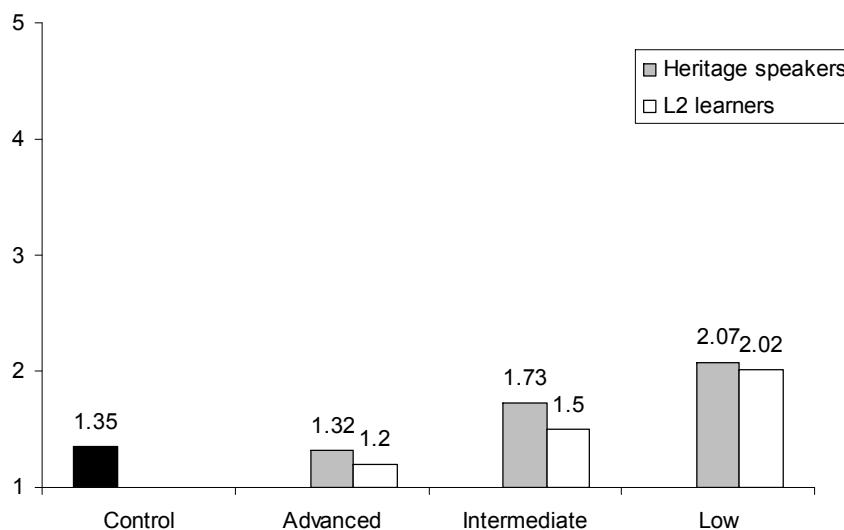


Figure 4. Mean acceptability judgments on object extractions without inversion.

Let us now discuss the results of sentences with adjunct islands *¿*A quién habló José con María después de ver?* (*Who did José talk to Mary after seeing?), ungrammatical in Spanish and English. The statistical result, once again, showed no difference by groups (heritage speakers $M = 1.64$, $SD = 0.59$ vs. L2 learners $M = 2.03$, $SD = 0.90$) but a statistical difference by proficiency level, since the lower proficiency bilinguals assigned higher ratings to ungrammatical sentences ($M = 2.35$, $SD = 0.92$) than the advanced ($M = 1.38$, $SD = 0.32$) and intermediate level bilinguals ($M = 1.78$, $SD = 0.70$) ($F = (2, 152) = 17.219$, $p < 0.0001$).

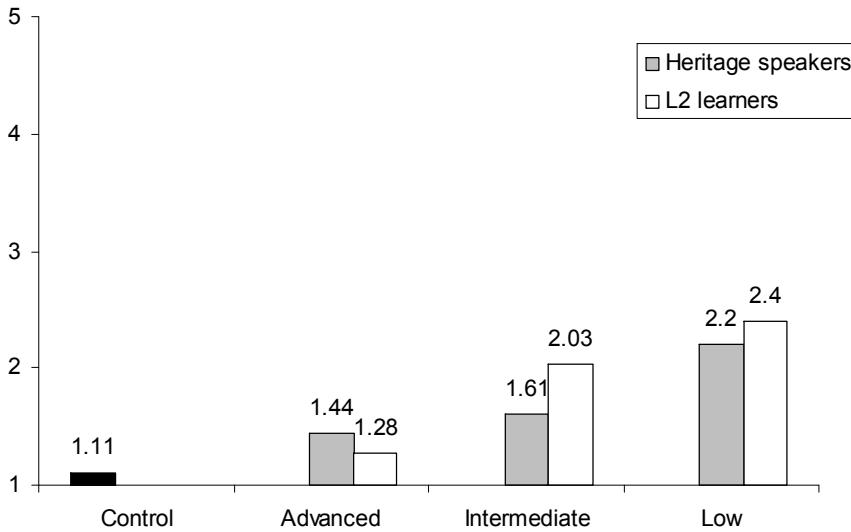


Figure 5. Mean acceptability judgments on sentences with adjunct islands.

Figure 6 displays the results of one of the sentence types which is crucial to test the research hypothesis of our study, that is, embedded sentences with no complementizers, such as **María dijo ella es de Colombia* (Maria said she is from Colombia). Sentences such as these are ungrammatical in Spanish but grammatical in English.

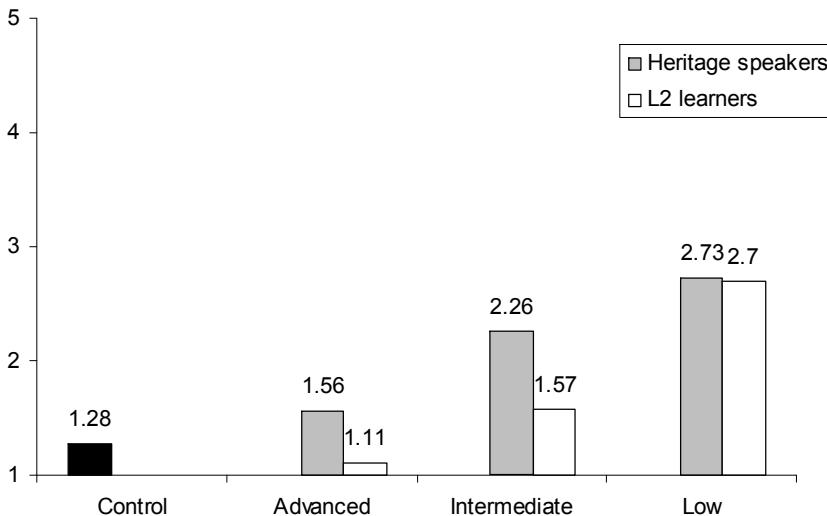


Figure 6. Mean acceptability judgments on embedded sentences with no complementizers.

The statistical analysis for these sentences showed a significant difference by group ($p < 0.024$) and by proficiency level ($p < 0.0001$). The advanced and intermediate heritage speakers accepted these ungrammatical sentences more than the L2 learners.

Figure 7 illustrates the acceptability ratings for embedded sentences with object extractions, *¿Qué dijo Juan que María compró?* (What did Juan say that Maria bought?), which are grammatical in the two languages. The statistical analysis for these sentences revealed no differences between the heritage speakers and the L2 learners by group or by level.

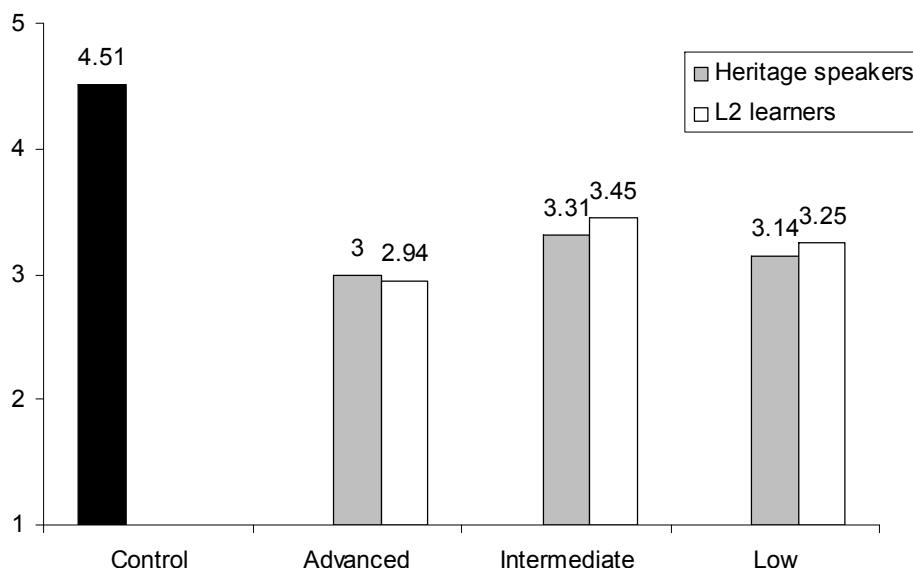


Figure 7. Mean acceptability judgments on embedded object extractions.

Finally, Figure 8 shows the results of the other sentence type of interest to our study: embedded sentences with subject extractions like *¿Quién piensa María **que** es de Argentina?* (*Who does Maria think that is from Argentina?), which require an overt complementizer in Spanish, unlike English. The statistical results were identical to those of embedded object extraction: there were no differences between groups or by proficiency level. However, in both object and subject extractions from embedded sentences, the bilinguals assigned lower ratings than the native speakers.

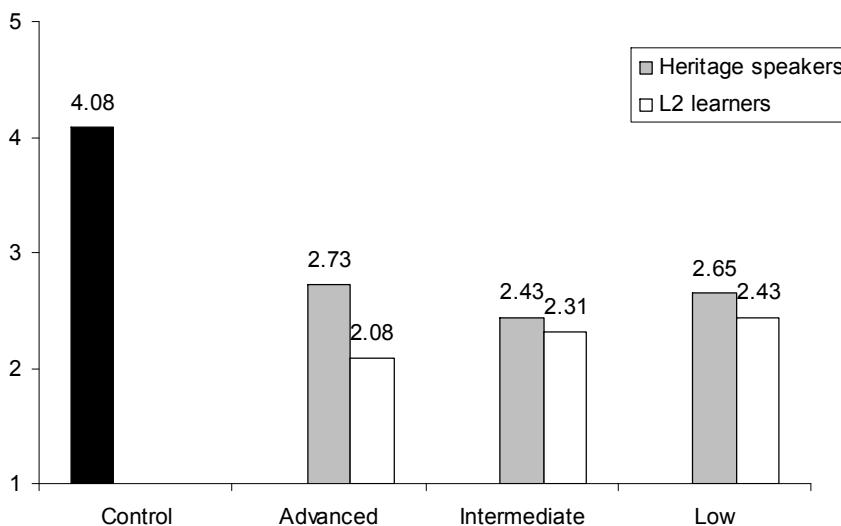


Figure 8. Mean acceptability judgments on embedded subject extractions

To summarize thus far, heritage speakers and L2 learners patterned alike, displaying the same type and degree of language transfer from English onto Spanish, although in cases of complementizer omission the intermediate and advanced proficiency heritage speakers gave slightly higher ratings than the L2 learners. Overall, transfer from English was stronger in speakers of lower proficiency in the language (both early and late bilinguals), rather than in speakers who started their L2 acquisition late (L2 learners).

In general, it seems that L2 learners and heritage speakers have solid knowledge of constraints on wh-movement in Spanish, even for sentences where transfer from English was predicted, such as sentences with no complementizers and embedded sentences with subject extraction (due to the presence of the complementizer). Thus, bilinguals know that complementizers are not optional in Spanish as they are in English. However, an interesting finding is that, even if sentences with subject extraction were accepted, the acceptability rate was below 3 for all the bilinguals and slightly above 4 for the control group. Sentences with object extraction, by contrast, were rated slightly above the 3 mark by the bilingual groups. Figures 9 and 10 compare the results of embedded sentences with subject and object extractions.

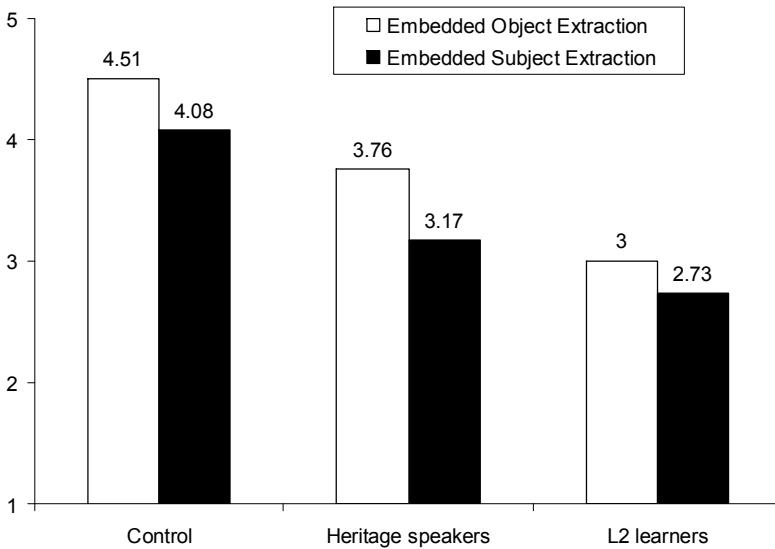


Figure 9. Mean acceptability judgments on embedded object and subject extractions.

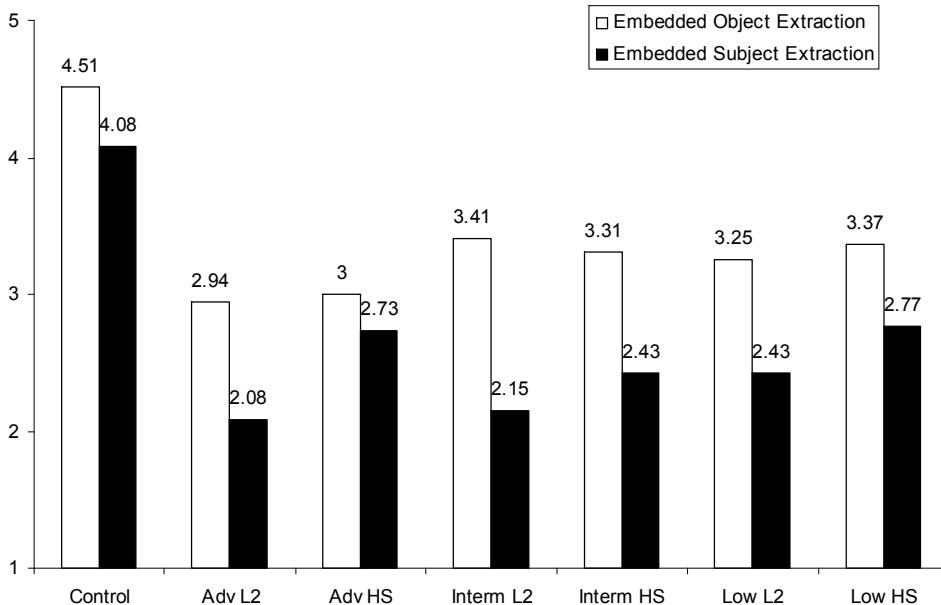


Figure 10. Mean acceptability judgments on embedded object and subject extractions by proficiency levels.

The statistical analysis showed that the two bilingual groups and the control group rated sentences with object extractions significantly higher on the scale provided than sentences with subject extractions ($F(1, 148) = 34.051, p < 0.0001$). Since the strength of acceptance for subject extraction sentences was also statistically weaker for the native speaker controls, this result is consistent with other L2 acquisition studies showing that the problem with subject extractions may be due to complexity of processing or parsing, rather than transfer of grammatical elements itself (White & Juffs 1998, Juffs & Harrington 1995, Juffs 2005). To pursue this possibility, we now turn to an analysis of individual results.

3.4.3 Individual Results

For this analysis, we looked closely at the individual responses for sentences with no complementizers, and embedded sentences with subject and object extractions. If a participant assigned individual ratings of 4 or 5 to at least 3 of 5 sentences within each type, it was considered that that particular individual consistently accepted those sentences. Three or more ratings of 1 or 2 per type were interpreted as consistent rejections. Table 3 summarizes possible response patterns.

Table 3. Response patterns on sentences with no complementizer and embedded subject extractions.

<i>Response pattern</i>	<i>No comp</i>	<i>Embedded subj. ext.</i>	<i>Embedded obj. ext.</i>	<i>interpretation</i>
A	reject	accept	accept	No grammar or processing deficit
B	accept	reject	accept	English-based grammar
C	reject	reject	reject	Processing deficit
D	accept	accept	accept	Grammatical and processing deficit or response bias

Participants conforming to pattern A can be deemed to have no difficulty, since this is the expected response pattern for Spanish. If subjects incorrectly accept sentences with optional complementizers in Spanish, correctly accept embedded sentences with object extractions and reject embedded sentences with subject extractions, then this pattern of response is consistent with the adoption of an English-based grammar (Full transfer). Pattern C, which correctly rejects sentences with optional complementizers, but also rejects embedded sentences with extractions, may be taken to suggest that participants know the grammatical distribution of complementizers in Spanish, but have difficulty accepting sentences with extractions due to processing cost, as suggested in the L2 literature (see section above). Finally, pattern D, which is theoretically the least expected one is consistent with a number of interpretations: participants can have a grammatical deficit, a processing deficit, or both, or it can simply be response bias because participants are accepting everything. With these possible patterns in mind, Table 4 quantifies the number of subjects per group—including the control group of native speakers—who fall under these patterns, and Figure 11 summarizes the percentage of subjects falling in each pattern by group.

Table 4. Response patterns on sentences with no complementizers and embedded subject extractions by group.

		N	<i>Spanish</i> A	<i>English</i> B	<i>Processing</i> C	<i>Both</i> D
	control	22	19	--	3	--
Heritage speakers	advanced	29	15	1	12	1
	intermediate	23	5	4	14	--
	low	11	2	1	7	1
L2 learners	advanced	18	4	--	14	--
	intermediate	16	4	--	12	--
	low	36	4	5	22	5

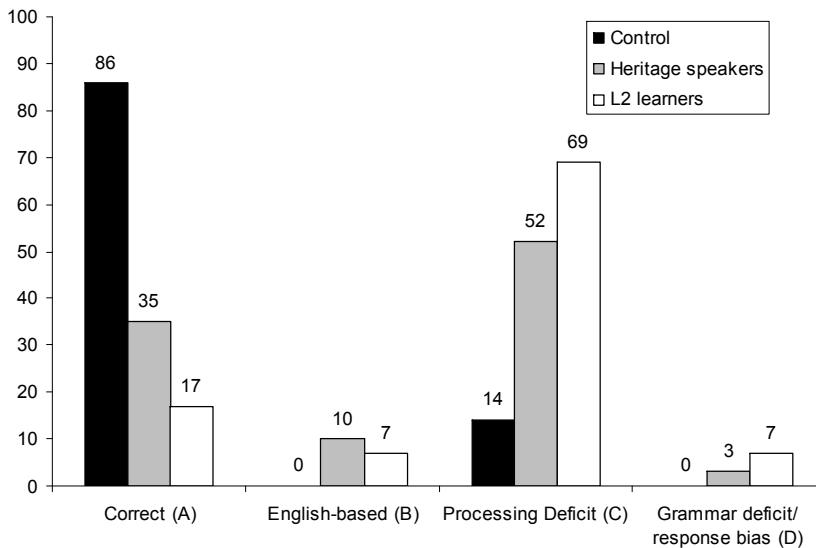


Figure 11. Percentage distribution of individuals in each group by patterns of responses.

Results showed that the overwhelming majority of the native speaker controls have the Spanish response pattern (A), while 14% display pattern C, which is consistent with having difficulty processing embedded sentences with extractions. By contrast, the majority of L2 learners and heritage speakers show a pattern of response consistent with having processing difficulties. Interestingly, many more heritage speakers display the Spanish pattern than L2 learners. Finally, very few bilinguals responded in a manner consistent with having an English-based grammar (full transfer), and even less participants fell under the unexpected D pattern.

4. Discussion and Conclusion

The results of this study suggest that early and late bilinguals know the constraints on wh-movement in Spanish. This may be due to the fact that both Spanish and English behave linguistically alike in this respect, with a few exceptions. Complementizers in Spanish cannot be omitted, and subject extractions from embedded clauses containing an overt complementizer are grammatical in Spanish. In these cases, results showed minimal evidence of language contact. There was very weak evidence of transfer from the stronger language onto the weaker language. Unlike what has been found for aspects of phonology and morphosyntax (Au *et al.*, 2002; Knightly *et al.* 2003; Montrul 2005,

Montrul *et al.*, 2006), group results did not reveal differences between L2 learners and heritage speakers. At least in this grammatical domain, early onset of acquisition of Spanish does not confer an added advantage. Thus, our hypothesis framed in terms of age of acquisition was not confirmed. The second hypothesis, which predicted language transfer by proficiency levels was weakly supported, since the minimal transfer effects detected in this study were more pronounced in low proficiency speakers, both L2 learners and heritage speakers.

Yet, the most revealing result of this study is that, even when the bilinguals know that complementizers in Spanish are obligatory, the ratings for embedded sentences with subject extraction were lower than for other grammatical sentences, including embedded sentences with object extractions. Similar asymmetry in the acceptability and processing of subject and object extractions have been documented by previous L2 studies (White & Juffs 1998, Juffs & Harrington 1995). In these studies, the native language of the L2 learners' in these studies was Chinese, a language with no overt wh-movement. The fact that our study revealed similar results, even when the target language (Spanish) and the dominant language (English) have overt movement, suggests that the problem with subject extractions from embedded sentences may also be related to difficulty of processing, rather than with the presence of the complementizer in Spanish (and subject verb inversion). Thus, it is possible to conclude that early and late bilinguals have the correct grammatical representation of Spanish, but difficulties accepting these sentences lie elsewhere, outside the grammar.

In order to further pursue this possibility, we conducted an analysis of individual response patterns. Results overwhelmingly confirmed that, for the majority of L2 learners and heritage speakers, the lower acceptability of sentences with subject extraction are not due to the obligatory presence of the complementizer in Spanish but, instead, they may be due to processing costs in general. Further support for this interpretation comes from the fact that out of all the L2 learners and heritage speakers who rejected embedded subject extractions, 86% of L2 learners and 75% of heritage speakers also rejected embedded object extractions. This suggests that these bilinguals find extractions from embedded clauses difficult in general.

Once we looked at the results in this way, we found that a higher percentage of heritage speakers (35%) than of L2 learners (17%) showed evidence of having the correct grammatical representation of the target structures and no processing problems, whereas a higher percentage of L2 learners (69%) than of heritage speakers (52%) appear to have problems with the processing of subject extraction sentences. Unlike the group results, the individual subjects' analysis suggests that proficiency-matched heritage speakers approximate native speakers more than L2 learners, especially when it comes to processing. Admittedly, our interpretation of these results has to be taken with caution since we are reaching conclusions on sentence processing from the results of an off-line grammaticality judgment task. We strongly believe that this hypothesis needs to be corroborated with further experimentation using appropriate psycholinguistic techniques. In other words, will these differences between subject and object extraction show up, or be more revealing, in an on-line processing experiment?

In conclusion, the results of this study show that there is virtually no language contact, evidenced as transfer from English, in sentences with wh-movement in Spanish. Both early and late bilinguals have robust knowledge of this aspect of Spanish syntax. To corroborate whether difficulty with subject extractions with embedded sentences is due to processing cost and not to a grammatical deficit, a follow-up study will test the same types of bilinguals in their two languages with on-line processing tasks. Such a study will also allow us to test directly the recently proposed Shallow Processing Hypothesis (Clahsen & Felser 2006) to explain alleged processing differences between native speakers and adult L2 learners.

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