

Introduction

Converging evidence from various linguistic subfields suggests that early and late bilinguals diverge in regard to an array of properties of the linguistic system (De Houwer, 1993; Schaeferlaekens, 1998; Zentella, 1997; Harley & Wang, 1997)

This project expands the comparison of early and late bilinguals to a phenomenon yet to be investigated in this context: relative clause attachment

Consider the following sentences, where the relative clause can potentially modify either of two different Noun Phrases (NPs):

- (1) *The wolves will attack the cubs_i of the coyotes_j [that sleep all day]_{i,j}.*
 (2) *Los lobos atacarán los cachorros_i de los coyotes_j [que duermen todo el día]_{i,j}.*

Although grammatical either way, distinct preferences have been found – English: Second NP, a.k.a. low attachment (LA) (Frazier, 1978)
 – Spanish: First NP, a.k.a. high attachment (HA) (Cuetos & Mitchell, 1988)

Processing research has investigated this conflict in bilinguals – However, early (Fernández, 2003) and late (Dussias, 2003; Dussias & Sagarra, 2007; Jegerski, 2010) bilinguals are always investigated independently

This study fills this gap in the literature – Investigates the relative clause attachment preferences of highly proficient early and late Spanish/English bilinguals as compared to monolingual speakers in both languages
 – Bilinguals are proficiency-matched and demographically comparable
 – Bilinguals are only differentiated by age of acquisition

Methods

Participants

Four groups:

	Monolingual English (N = 26)	Spanish (N = 19)	Bilingual Late (N = 21)	Early (N = 18)
Age of acquisition				
English	Since birth	–	Since birth	≤ 6 years
Spanish	–	Since birth	> 10 years	≤ 6 years
Place of birth	US	Mexico	US	US or Mexico
Other language(s)	None	None	None	None
Proficiency score				
English	≥ 30 (of 40)	–	≥ 30 (of 40)	≥ 30 (of 40)
Spanish	–	≥ 35 (of 50)	≥ 35 (of 50)	≥ 35 (of 50)
Age range	23-68 years	20-43 years	23-52 years	21-54 years
Median age	35.8 years	30.2 years	32.6 years	31.4 years

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Review of Literature

Monolingual Relative Clause Attachment

Cross linguistic evidence for the processing of relative clause attachment – LA: English, Mandarin Chinese (Shen, 2006), Romanian (Ehrlich et al. 1999)
 – HA: Spanish, Dutch (Brybaert & Mitchell, 1996), French (Baccino, De Vincenzi & Job, 2000)

Factors found to play a role:

- Task type (on-line measures vs. off-line measures)
- Animacy of the NPs (Desmet, Brybaert & De Baecke, 2002)
- Prepositions (De Vincenzi & Job, 1993)
- Prosody (Quinn, Abdelghany & Fodor, 2000)
- For a full review see Fernández (2003)

Grillo & Costa (2014) even argue for a grammatical difference between HA and LA languages (only HA languages have free relatives, which are superficially identical to relative clauses)

Bilingual Relative Clause Attachment

Spanish/English early bilinguals – Fernández (2002, 2003): Processing determined by dominant language
 – Jegerski, Keating & VanPatten (2014): Preference for HA in Spanish despite intensive and extensive immersion in an English-language environment and despite being English dominant

Spanish/English late bilinguals

- Dussias (2003), Dussias & Sagarra (2007): L1 Spanish L2 English bilinguals with limited exposure to an English environment exhibited HA in Spanish, but those with extensive exposure exhibited LA
- Jegerski (2010): Highly proficient L1 English L2 Spanish learners who had lived in Mexico showed native-like processing with Spanish relative clauses

There has yet to be a comparison between early and late bilinguals, nor are the methods and qualifications consistent among previous studies

Research Questions

Overarching question:

- Do early and late bilingual speakers of English and Spanish diverge with regard to relative clause attachment preference?

To that end, we aim to answer these specific questions:

- RQ1: Do monolinguals of Spanish and English differ from each other?
- RQ2: Do late bilinguals differ from monolinguals?
- RQ3: Do late bilinguals differ between their two languages?
- RQ4: Do early bilinguals differ from monolinguals?
- RQ5: Do early bilinguals differ between their two languages?

Hypothesis 1: Yes, there is a difference

- Following Cuetos & Mitchell (1988)

Hypothesis 2: No, there is no difference

- Following Cuetos & Mitchell (1988) for L1; Dussias & Sagarra (2007) and Jegerski (2010) for L2

Hypothesis 3: Yes, there is a difference

- Follows from Hypotheses 1 and 2

Hypothesis 4: No, there is no difference

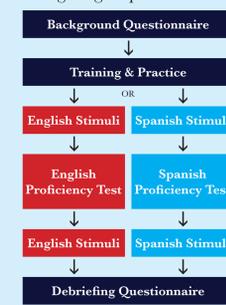
- Following Jegerski et al. (2014) for Spanish; null hypothesis for English

Hypothesis 5: No, there is no difference

- Null hypothesis

Experimental Procedure

Monolingual groups:



Bilingual groups:



(All blocks of stimuli were counterbalanced)

Shared criteria for both bilingual groups:

- Reported using both languages at least 10% of the time on a daily basis
- Controlled for dominance using language background questionnaire

Experimental Stimuli

Interpretation task with 64 ambiguous HA/LA target stimuli per language – Attachment preference measured off-line via a forced choice question

- (3) a. *The wolves will attack the cubs of the coyotes that sleep all day.*
 b. *Who sleeps all day?* (The cubs; The coyotes)

- (4) a. *Los lobos atacarán los cachorros de los coyotes que duermen todo el día.*
 b. *¿Quién duerme todo el día?* (Los cachorros; Los coyotes)

An additional 128 distractors per language

- 64 with ambiguous HA/LA due to pronoun use
- 64 with unambiguous HA/LA due to semantic interpretation, which were used to determine participant accuracy (which needed to be ≥ 80%)

Results

Dependent variable coded as Percent High (i.e., percentage of the time that the participants provided a response of HA)

Item analysis of the monolingual speaker data

- Strong correlation between both languages for Percent High across all items ($r = 0.773, p = 0.000$)
- If a sentence showed HA, the translational equivalent likely showed HA
- Language a significant predictor of Percent High ($t = -2.350, p = 0.022$)
- However, Spanish did show more HA overall, as some items broke with the correlation (about a quarter)
- If Spanish and English only differ for a portion of the items, it is important to isolate those items

Item categorization to better model the data

- Different (N = 16): Broke from the correlation (i.e., highest absolute value of the difference in Percent High between the two languages)
- Low (N = 16): Lowest Percent High (irrespective of language)
- High (N = 16): Highest Percent High (irrespective of language)
- None (N = 16): No attachment preference (irrespective of language)

Hypothesis 1: Partially confirmed (see Figure 1)

- Spanish and English monolinguals differ with regard to relative clause attachment preference, though only for a subset of the items (i.e., the type Different)

Why no cross-linguistic difference for three quarters of the stimuli?

- Pragmatic considerations
- Following Fernández (2003), plausibility was tested to make sure that the relative clause could logically attach to either NP (5b, 6b)
- However, this did not test for a bias of plausibility for one over the other

- (5) a. *The men are going to paint the walls of the houses that need a coat of paint.*
 b. *The walls need a coat of paint. / The houses need a coat of paint.*

- (6) a. *We better not waste the bullets of the guns that cost a fortune.*
 b. *The bullets cost a fortune. / The guns cost a fortune.*

Hypothesis 2: Partially confirmed (see Figure 2)

- Late bilinguals do not differ from English monolinguals
- However, late bilinguals differ from Spanish monolinguals in some types (i.e., Different, None) but do not differ in others (i.e., High, Low)

Hypothesis 3: Confirmed (see Figure 2)

- Late bilinguals differ between their two languages (consistently across all types)

Hypothesis 4: Confirmed (see Figure 3)

- Early bilinguals do not differ from English nor Spanish monolinguals

Hypothesis 5: Confirmed (see Figure 3)

- Early bilinguals do not differ between their two languages (which includes not having a monolingual-like difference in the type Different)

Summary

- Of the various comparisons, differences were found with regard to relative clause attachment preference in three instances:
 - Between the two monolingual groups for the type Different
 - Between late bilinguals and Spanish monolinguals for the types Different and None
 - With late bilinguals between their two languages for all types

Figure 1. Percent High for monolinguals by language

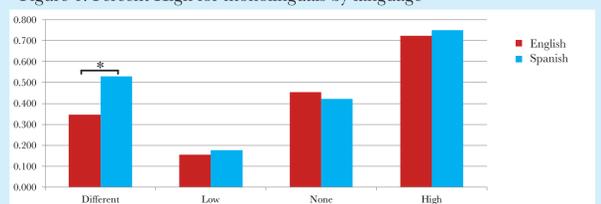


Figure 2. Percent High for late bilinguals and monolinguals by language

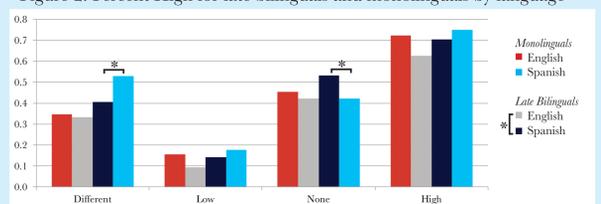
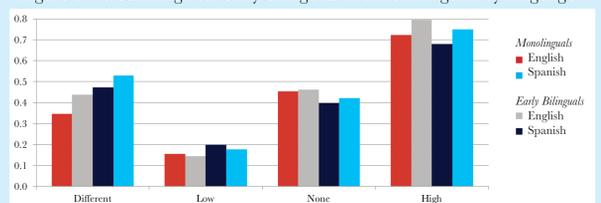


Figure 3. Percent High for early bilinguals and monolinguals by language



Discussion

Monolinguals: Distinct attachment preferences based on language

- Confirms previous research that has shown a LA bias in English and HA in Spanish
- Importantly, though, it was only in a subset of the data, suggesting that a more-fined approach to plausibility is necessary for future studies

Late bilinguals: Distinct attachment preferences between L1 and L2; only native-like for half of the L2 items

- Contrary to previous research; cannot say for certain why

Early bilinguals: Monolingual-like for both languages; yet no distinct attachment preferences based on language (which would seem not monolingual-like)

- Confirms previous research for Spanish; novel finding for English
- If one assumes grammar and processing are linked, this suggests a convergence (Bullock & Toribio, 2004; Serratrice, Sorace & Paoli, 2004) that smooths out the edges that differentiate the two grammars
- This convergence occurs when an L2 is acquired before an L1 is mature, but not when an L2 is acquired after an L1 is fully formed

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Conclusions

These results are novel in that it is the first comparison between early and late bilinguals with consistent methods and qualifications

This study provides further evidence that early and late bilinguals diverge in regard to their respective linguistic systems

Acknowledgments

We would like to thank: members of the Bilingualism Research Lab; Kara Morgan-Short and Bernard Issa; Kim Potowski and Benito Juárez Autonomous University of Oaxaca; Jill Jegerski; UIC School of Literatures, Cultural Studies & Linguistics; audiences of the 11th International Symposium of Psycholinguistics and Multilingualism – The Key Debates

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