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Prosodic phrasing of relative clauses with two possible antecedents in Spanish: A comparison of Spanish native speakers and L1 Basque bilingual speakers

Abstract: The present production study investigates the prosodic phrasing characteristic of sentences containing a relative clause with two possible noun phrase antecedents [Noun Phrase 1 Noun Phrase 2 Relative Clause] in the variety of Spanish spoken in the Basque Country. It aims to establish the default prosodic phrasing of these structures, as well as whether differences are found in phrasing between native and non-native speakers. Additionally, it examines the effect on prosodic phrasing of constituent length and familiarity with the sentences (skimming the sentences prior to reading them aloud). To do that, the productions of 8 Spanish monolinguals, 8 first language (L1) Spanish/second language (L2) Basque bilinguals, and 8 L1Basque/L2Spanish bilinguals are examined. A default phrasing consisting of the prevalence of a prosodic break after NP2 ([NP1 NP2/RC]) is obtained, and differences are found between the prosodic contours of native and non-native speakers. Additionally, a constituent length effect is found, with a higher frequency of prosodic boundaries after NP2 as RC length increases, as predicted by Fodor’s Same Size Sister Constraint. Last, familiarity with the sentences was found to increase the frequency of occurrence of the default phrasing.

Keywords: relative clauses, prosodic phrasing, constituent length, skimming, bilinguals

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1 Introduction

The present study investigates the prosodic phrasing in Spanish of sentences in which a complex noun phrase (NP) is modified by a relative clause (RC). To that end, the results of a production experiment with Spanish monolingual and Basque/Spanish bilingual speakers of the variety of Spanish in the Basque Country are presented. The present study has two goals. First, it aims to describe the intonation characteristics of the sentences under investigation (i.e., the default phrasing) and examine whether any differences arise in prosodic phrasing between native and non-native speakers of this variety of Spanish. Additionally, it seeks to determine whether the default phrasing of these constructions is modulated by two factors that have been proposed as potentially influencing prosodic phrasing, namely, constituent length and familiarity with the sentences (acquired by skimming the sentences prior to reading them aloud).

The present investigation focuses on syntactically ambiguous sentences, specifically, constructions which contain a complex NP that is head to an RC (e.g., Someone shot the servant of the actress who was on the balcony). In this type of sentences, the ambiguity lies in the attachment site of the relative clause in the complex NP. Thus, given a complex NP (i) consisting of an NP and a prepositional phrase (PP) containing another NP and (ii) followed by a RC, a syntactic ambiguity results from the fact that both NPs can be antecedents of the RC. This ambiguity is illustrated in (1):

(1) Someone shot the servant_{NP1} of the actress_{NP2} who was on the balcony_{RC}.

The empty subject in the RC can either be coreferent with the structurally higher NP the servant or with the structurally lower NP the actress. In the processing literature, the first interpretation is referred to as high attachment and the second interpretation is called low attachment. The syntactic attachments are illustrated in the tree diagrams in Figures 1(a) and 1(b).

The attachment preferences of the RC are not uniform across languages, as shown by the results of numerous processing studies that investigated the resolution of this ambiguity. A low attachment preference has been reported for English (Cuetos and Mitchell 1988), Italian (De Vincenzi and Job 1993), Norwegian, Romanian, and Swedish (Ehrlich et al. 1999), Basque (Gutierrez et al. 2004), and Brazilian Portuguese (Miyamoto 1998), whereas a high attachment preference has been found for Dutch (Brysbaert and Mitchell 1996), Spanish (Cuetos and Mitchell 1988; Acuña-Fariña et al. 2009), European
Portuguese (Soares et al. 2010), Galician (Fraga et al. 2005), Afrikaans (Mitchell et al. 2000), German (Hemforth et al. 1998), and French (Zagar et al. 1997).

Although several hypotheses have been put forth, there is no comprehensive account for why some languages show one or another attachment preference. Fodor (1998, 2002) proposes the Implicit Prosodic Hypothesis (IPH),

**Figure 1:** (a) High attachment: The gap in the RC is coreferent with the higher N. (b) Low attachment: The gap in the RC is coreferent with the lower N.
according to which the differences in attachment preference might result from
cross-linguistic differences in the prosody of these sentences; in other words,
these constructions are argued to have a default prosodic phrasing in each
language that influences the resolution of the ambiguity. Research on attach-
ment preferences of ambiguous RCs has traditionally been centered on silent
reading comprehension. Fodor’s IPH states that during silent reading, the
reader provides the words with accent and intonation, creating prosodic
boundaries that influence the syntactic processor in a way similar to explicit
prosody.

Maynell (1999) and Lovrić et al. (2000, 2001) propose that the occurrence of
a prosodic break before the RC (represented as [NP1 NP2/RC]) is the default
phrasing associated with a high attachment preference. Supporting evidence for
this claim has been provided by Jun and colleagues (Jun 2003; Jun and Kim
2004; Jun and Koike 2008). The first aim of the present investigation is thus to
describe and analyze the default phrasing of these constructions in Spanish, in
which a high attachment preference is well documented (Cuetos and Mitchell
1988; Carreiras and Clifton 1993; 1999; Carreiras et al. 2004) and, specifically, to
examine whether the prosodic phrasing predicted in Spanish ([NP1 NP2/RC]) is
found in the variety of Castilian Spanish spoken in the Basque Country.
Additionally, the present investigation aims to find out whether potential differ-
ences arise in the intonation projected onto these constructions between native
speakers of this variety of Spanish and highly proficient non-native speakers
who are native speakers of Basque. In Basque, a low attachment preference has
previously been reported (Gutierrez et al. 2004). To that end, we present the
results of a production experiment in which the prosodic phrasing of these
sentences is analyzed for production by native speakers (i.e., Spanish mono-
linguals and L1Spanish/L2Basque bilinguals) and by non-native speakers (i.e.,
L1Basque/L2Spanish bilinguals).

The second aim of the present study is to investigate the potential influ-
ence of constituent length (specifically, length of the RC) and familiarity with
the sentences on these constructions’ prosodic phrasing. The length of the RC
has been proposed to correlate with the probability of inserting a prosodic
boundary between the NP2 and the RC in sentences that contain [NP1 NP2 RC]
sequences.\footnote{We adopt the syntactic scheme [NP1 NP2 RC] traditionally used to describe this structure.
Note, however, that the NP2 forms part of a PP, as illustrated in Figure 1(a) and 1(b).} It has been shown that long RCs increase the likelihood of a
prosodic break prior to the RC (Jun and Kim 2004; Jun and Koike 2008). This effect might result from a constraint on phrasing, as formulated in
Fodor’s (1998) Same Size Sister Constraint. According to this constraint, prosodic constituents require same-sized sisters, i.e., they tend to have equal length. Thus, long RCs would tend to form a prosodic constituent on their own, and the complex NP, [NP1 NP2], would hence constitute a separate prosodic constituent, whereas in short RCs, NP2 and RC would tend to form one prosodic constituent. In order to investigate these potential constituent length effects, RC length was manipulated in the present study’s experimental sentences, resulting in three blocks of sentences that differed in RC length (i.e., short, medium, and long RCs). If, indeed, a correlation exists between size of the RC and prosodic break insertion, we predict that in long RCs an intonational boundary will occur between NP2 and the RC, whereas in short RCs a break will be inserted between NP1 and NP2. If, on the other hand, the default phrasing characteristic of these constructions in Spanish (the phrasing associated with a high attachment, i.e., [NP1 NP2/RC]) overrules potential constituent length effects, a general contour characterized by the presence of a boundary between NP2 and the RC is predicted.

Familiarity with the experimental sentences prior to reading them aloud (i.e., access to the semantic information of the whole sentence) has also been proposed to influence prosodic phrasing. Jun and Koike (2008) showed that the prosodic grouping associated with high attachment – insertion of a break between the RC and the adjacent NP [RC/NP2 NP1] – is the default phrasing produced by Japanese speakers. Interestingly, Jun and Koike (2008) found that participants who skimmed the sentences briefly before reading them aloud produced a significantly higher number of utterances that contained no single prominent element within the critical region: they produced utterances with either no boundary or two equally strong boundaries (after NP1 and after NP2). In addition, participants produced a lower number of sentences that contained a prosodic boundary between NP2 and NP1 ([RC NP2/NP1]), the non-default prosodic phrasing in Japanese, but showed no difference in the frequency of the default phrasing [RC/NP2 NP1]. In the present investigation, we included the variable of familiarity in order to observe whether skimming similarly influenced the prosodic contours projected by the participants in our experiment.

Japanese is a head-final language which differs from Spanish and English (both head-initial languages) in its word order. In Japanese, the RC precedes the complex NP and the head of the complex NP appears in final position. Thus, the resulting syntactic scheme in Japanese is here represented as [RC NP2 NP1], where NP2 corresponds to the actress and NP1 is the head of the complex NP, which corresponds to the servant.
2 Methodology

2.1 Participants

Twenty-four undergraduate students (eighteen female) from the University of the Basque Country UPV/EHU, with ages ranging from 18 to 32 years, took part in this production experiment. Participants were sorted into three groups depending on their knowledge of Basque and Spanish: (i) a group of eight monolingual speakers of the variety of Spanish spoken in the Basque Country, (ii) a group of eight L1Basque/L2Spanish bilinguals (age of acquisition 3–5 years), and (iii) a group of eight L1Spanish/L2Basque bilinguals (age of acquisition 3–5 years). Data concerning the linguistic background of the participants were collected by means of a questionnaire that inquired about the acquisition and use of the languages by the participants. As reported by the participants, all L1Spanish bilinguals were raised in Spanish-speaking homes at least until adolescence, whereas all L1Basque bilinguals were raised in Basque-speaking homes at least until adolescence. Both groups of bilinguals were early acquirers of their L2 and highly proficient in it. All bilinguals received a bilingual education and had therefore formal knowledge both in Spanish and Basque.

2.2 Materials

Forty-eight experimental sentences were designed, all of them containing a complex NP followed by a RC: [NP1 NP2 RC]. All the sentences were syntactically ambiguous: the RC could modify either NP1 or NP2, as exemplified in (2):

(2) Un ladrón robó al mayordomo del señor que llegaba a casa.

‘A thief robbed the butler of the man who arrived home.’

In order to examine the potential role of constituent length on prosodic phrasing, the length of the RCs was manipulated, sorting the sentences into three blocks: block 1 contained 3- to 4-syllable long RCs; block 2 contained 6- to 7-syllable long RCs, and block 3 contained 9- to 11-syllable long RCs. Voiceless stops were avoided.

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3 Developed by members of the research group The Bilingual Mind (University of the Basque Country UPV/EHU, http://www.ehu.eus/HEB/).
inside the critical region (the complex NP and the beginning of the RC) in order to avoid disruptions in the F0 contours. A plausibility and naturalness test of the experimental sentences was carried out previous to the experiment. The sentences were mixed with 20 non-ambiguous fillers, all of them containing a final RC. Four lists were created, each of them with a different randomized order. Forty participants took part in the test. The task consisted of rating the sentences from not plausible/natural (1) to very plausible/natural (7). The 36 most natural/plausible sentences were selected (mean rate 6.16) (see Appendix).

The final 36 experimental sentences were pseudo-randomly mixed with a set of 48 non-ambiguous fillers. All fillers contained final RCs, whose length was also manipulated, creating three blocks: 3- to 4-, 6- to 7-, and 9- to 11-syllable long RCs. Two sets of sentences were created that varied only in the ordering of the items and fillers.

2.3 Procedure

Participants were recorded individually in an anechoic room in the Phonetics Laboratory at the University of the Basque Country UPV/EHU. Half of the participants in each group received one of the two sets of sentences, and the remaining half received the other set. Participants were asked to read these sentences aloud and at a normal pace, as close as possible to their natural speech. The sentences were displayed on a computer screen by means of a PowerPoint presentation, which was viewed twice, i.e., each sentence was uttered and recorded two times. Each participant produced a total of 168 utterances, 72 of which were experimental sentences. The whole session took about twenty to thirty minutes for each speaker.

In order to examine potential effects of familiarity with the sentences on the prosodic phrasing, half of the participants were randomly chosen and asked to skim each sentence briefly before reading it aloud (a total of twelve participants, four per linguistic group). The rest of the participants were not allowed to skim the sentences before reading them aloud. The data were collected with a DAT recorder and an AKG condenser cardioid microphone. The utterances were subsequently segmented into separate files and saved to hard disk using the program for acoustic analysis PRAAT (Boersma and Weenink 2008).

2.4 Analysis

A total of 4032 utterances were recorded (24 participants × 168 utterances per speaker), 1728 of the utterances corresponding to the experimental sentences and 2304 to the distractor sentences. Forty of the recorded experimental
sentences were excluded from the analysis due to disfluencies in production (2.3% of the data), so a total of 1688 utterances were submitted for analysis of the prosodic segmentation of the critical region, i.e., the sequence [NP1 NP2 RC]. The recorded utterances were annotated by a trained phonetician and partially checked by a second trained phonetician.

In order for a boundary to be labeled, one or more of the following cues had to be present: (i) a sufficiently prominent intonational rise, reaching a high pitch level (sometimes the highest level in the utterance); (ii) a substantial fall in pitch after the final rise, the biggest fall in the utterance; (iii) final lengthening of the syllable before the break; (iv) pause.

Following this analysis, the participants’ utterances were classified into three categories: (i) utterances that contained a prosodic break after NP1 [NP1/NP2 RC], (ii) utterances that contained a prosodic break after NP2 [NP1 NP2/RC], and (iii) utterances with no single prominent element within the critical region. In turn, this last category included two types of utterances: (i) utterances with no prosodic break within the critical region [NP1 NP2 RC] and (ii) utterances that contained two equally strong boundaries [NP1/NP2/RC]. Two boundaries were considered to be equally strong under the following circumstances: (i) when two pronounced rises reached a (largely) similar pitch height and were followed by abrupt falls on the first syllable of their respective subsequent words, (ii) when two equally long pauses were found, or (iii) when the final syllable of each NP displayed the same degree of final lengthening. Also, utterances that contained pronounced pitch rise in the last syllable of one NP and a pause or pronounced lengthening in the other NP or other such combinations of cues were considered utterances with two equally strong boundaries.

Thus, in Figure 2, the boundary after NP2 is identified by the high pitch level of the rise at its end, and the abrupt fall onto the first syllable of the RC, que ‘that/who’ (the bottom is reached on the vowel e). In this particular utterance there was final lengthening on the last syllable of the NP2 word marinero ‘sailor’ as well. In Figure 3, the boundary after NP1 is identified by the high pitch level reached at the end of NP1 (on the word amigo ‘friend’) and the large pitch fall after it. There was final lengthening on the last syllable of amigo as well. No boundary was annotated after NP2 because the rise at the end of NP2 is smaller than that after NP1 and the fall is also smaller, half of the one after NP1.

3 Results

The analysis of the data indicated that 70.38% of the total number of productions contained a strong prosodic boundary within the critical region, whereas the
remaining 29.62% of the utterances contained either no prosodic boundary ([NP1 NP2 RC]) or two equally strong boundaries ([NP1/NP2/RC]). In the overwhelming majority of utterances that contained a strong boundary within the critical region, this boundary was realized by means of a tonal rise (92.17%) (as shown in Figures 2 and 3 above).

As mentioned in the methodology section, each participant produced two renditions of each experimental sentence. No differences were found between the two renditions in any of the analyses conducted. Similarly, no differences were found between the participants who received the first set of sentences and those who received the second set of sentences. The data obtained in both renditions and lists were therefore collapsed in all subsequent analyses.
3.1 Default phrasing and potential differences between native and non-native speakers

The first aim of the present experiment was to describe the default phrasing of these constructions in the variety of Spanish spoken in the Basque Country, and to look for potential differences between native and non-native speakers of this variety. An analysis of the utterances that contained a boundary within the critical region revealed that 80.6% of the prosodic breaks were placed after NP2, whereas only 19.4% of the breaks were inserted after NP1. The main prosodic phrasing for these constructions was thus [NP1 NP2/RC].

Regarding the potential differences in the default phrasing between native and non-native speakers, contingency tables revealed a significant interaction between the location of the prosodic break (after NP1 or NP2) and linguistic group ($\chi^2 = 6.87, p = 0.032$). The group of L1Basque/L2Spanish bilinguals, that is, non-native speakers of Spanish, produced a significantly lower number of breaks after NP2 (75.81%) than the two groups of native speakers (L1Spanish bilinguals: 82.77%; Spanish monolinguals: 82.15%), as shown in Figure 4. The difference between the two groups of native speakers was not significant.

Further differences were found between the prosodic phrasing patterns of non-native and native speakers. Thus, L1Basque/L2Spanish bilinguals (non-native speakers of Spanish) produced a greater number of sentences that

![Figure 4: Percentage of prosodic boundaries after NP1 and NP2 per linguistic group. The group of L1Basque/L2Spanish bilinguals produced the default phrasing (i.e., insertion of boundary after NP2) less frequently than the groups of L1Spanish/L2Basque bilinguals and Spanish monolinguals.](image-url)
contained either no boundary or two equal boundaries in the critical region (38.36%) than the two groups of native speakers (L1Spanish bilinguals: 27.85%; Spanish monolinguals: 22.93%; L1Basque bilinguals vs. Spanish monolinguals: \(\chi^2 = 31.37, p < 0.001\); L1Basque bilinguals vs. L1Spanish bilinguals: \(\chi^2 = 14.02, p < 0.001\)). These results clearly reveal differences in the prosodic phrasing of these structures between native and non-native speakers of the variety of Spanish spoken in the Basque Country.

### 3.2 Potential influence of constituent length and familiarity with the sentences

#### 3.2.1 Constituent length

The correlation between location of the prosodic boundary and length of the RC was analyzed, in order to observe whether the presence of a long RC resulted in an increased prosodic break insertion between the NP2 and the RC, as found in previous studies (Jun and Kim 2004; Jun and Koike 2008). As mentioned in the methodology section, the experimental sentences were divided into three blocks depending on the length of the RC. Pairwise comparisons of these blocks revealed a significant difference in the distribution of prosodic breaks in all pairs (all \(p < 0.001\)), with the exception of the relation between the blocks containing medium and long RCs, in which the difference remained marginally significant (\(\chi^2 = 3.81, p = 0.051\)). These results show a correlation between site of prosodic break insertion and length of the RC. Thus, the longer a RC was, the greater the frequency of occurrence of a prosodic break after NP2, as shown in Figure 5. Individual analyses conducted per participant showed that this pattern was found in 19 of the 24 speakers (all \(p \leq 0.05\)). This pattern was also displayed by all three linguistic groups (Spanish monolinguals: \(\chi^2 = 88.37, p < 0.001\); L1Spanish bilinguals: \(\chi^2 = 115.95, p < 0.001\); L1Basque bilinguals: \(\chi^2 = 31.41, p < 0.001\)). Lastly, this pattern was displayed both by the participants who skimmed the sentences (\(\chi^2 = 118.33, p < 0.001\)) and the participants who were not allowed to skim them (\(\chi^2 = 97.23, p < 0.001\)).

The distribution of the prosodic breaks after NP1 and NP2 was therefore more balanced in the block containing the shortest RCs, although still in line with the general preference towards placing the boundaries after NP2, and no significant difference was found among the three linguistic groups (Spanish monolinguals: 56.6%; L1Spanish bilinguals: 54.1%; L1Basque bilinguals: 57.7%; all \(p > 0.570\)). In the blocks containing medium and long RCs, the overwhelming majority of
prosodic breaks were inserted after NP2 in all linguistic groups. However, L1Basque bilinguals (i.e., non-native speakers) produced significantly fewer boundaries after NP2 than Spanish monolinguals and L1Spanish bilinguals (i.e., native speakers) in both blocks, whereas no differences were found between Spanish monolinguals and L1Spanish bilinguals. (In medium-sized RCs, Spanish monolinguals: 92%; L1Spanish bilinguals: 96.2%; L1Basque bilinguals: 80.7%; Spanish monolinguals vs. L1Basque bilinguals: $\chi^2 = 7.21, p = 0.007$; L1Spanish bilinguals vs. L1Basque bilinguals: $\chi^2 = 14.86, p < 0.001$; Spanish monolinguals vs. L1Spanish bilinguals: $\chi^2 = 2.20, p = 0.138$. In long-sized RCs, Spanish monolinguals: 95.4%; L1Spanish bilinguals: 97.2%; L1Basque bilinguals: 88.2%; Spanish monolinguals vs. L1Basque bilinguals: $\chi^2 = 4.72, p = 0.03$; L1Spanish bilinguals vs. L1Basque bilinguals: $\chi^2 = 8.34, p = 0.004$; Spanish monolinguals vs. L1Spanish bilinguals: $\chi^2 = 0.73, p = 0.393$.)

3.2.2 Familiarity with the sentences

The potential influence of familiarity with the sentences on prosodic phrasing was analyzed, in order to observe whether skimming the sentences prior to reading them aloud influenced prosodic phrasing, as found by Jun and Koike (2008). An interaction was found between site of prosodic break insertion and
the variable “skimming”. Those participants who skimmed the sentences produced a significantly higher number of prosodic breaks after NP2 (86.7%) than those who did not skim the sentences (70.9%) ($\chi^2 = 45.27, p < 0.001$), as shown in Figure 6. Familiarity with the sentences before reading them aloud entailed thus a significantly higher frequency of the default contour observed with these structures in Spanish. This result is at odds with the finding reported by Jun and Koike (2008), who found a similar frequency of use of the default phrasing for both skimming and non-skimming participants in Japanese.

Further, participants who skimmed the sentences produced a significantly lower number of utterances that contained either no boundary or two equally strong boundaries within the critical region (21.4% of the total of utterances), as compared to non-skimming participants (39.5% of the total of utterances) ($\chi^2 = 65.83, p < 0.001$). Interestingly, Jun and Koike (2008) found the opposite effect in their investigation in Japanese.

### 4 Discussion

The present investigation aimed to determine the default prosodic phrasing of sentences containing a complex NP followed by a RC in the variety of Spanish spoken in the Basque Country. A prosodic contour in which a break is inserted after the NP2 was predicted, given that this contour has been associated with
languages with a high attachment preference (Maynell 1999; Lovrić et al. 2000 and Lovrić et al. 2001), and this preference has been found in processing studies in Spanish both with behavioral and electrophysiological measures (Cuetos and Mitchell 1988; Carreiras and Clifton 1993; 1999; Carreiras et al. 2004). This prediction was borne out by the results of the present investigation, as shown by the fact that 80.6% of all prosodic boundaries were placed after NP2. Thus, these results provide supporting evidence for the proposal that languages characterized by a high attachment preference have a default phrasing in which a break is inserted after NP2.

This investigation also aimed to examine whether differences arise in the prosodic phrasing between native speakers of this variety of Spanish (i.e., Spanish monolinguals and L1Spanish bilinguals) and highly proficient though non-native speakers (L1Basque bilinguals) who are native speakers of Basque, a language for which a low attachment preference has been reported (Gutierrez et al. 2004). The results indeed showed differences between these two populations. The group of L1Basque bilinguals produced a significantly lower number of utterances with the default phrasing (that is, with insertion of a break after NP2), and produced instead a greater number of utterances in which a prosodic break was inserted after NP1. These differences were found specifically in the two blocks containing the medium and long RCs. Also, this group of non-natives produced a greater number of utterances that contained either no strong boundaries or two equally strong boundaries within the critical region. These results suggest that non-native speakers, even highly proficient speakers who acquired their second language early in development, do not achieve full native-like prosody in their second language. Given that, to the best of our knowledge, no studies to date have addressed the prosodic phrasing patterns in ambiguous RCs in Basque, it is yet to be determined whether the different phrasing obtained in the group of L1Basque bilinguals reflects the default prosodic phrasing of their native language. Though not a specific aim of the present investigation, it is worth noting that no differences were found between the prosodic contours of the monolingual and bilingual participants, that is, between Spanish monolinguals on the one hand and L1Spanish and L1Basque bilinguals on the other.

A further goal of the present study was to examine the potential influence of constituent length, specifically length of the RC, on the prosodic phrasing projected onto the constructions under investigation. Long RCs have been proposed to lead to prosodic break insertion prior to the RC, possibly as a result of the Same Size Sister Constraint proposed by Fodor (1998), according to which prosodic constituents tend to have similar lengths. A long RC would thus form a prosodic constituent on its own, whereas the complex NP (i.e., [NP1 NP2]) would form a second constituent. Similarly, a short RC would be packaged with the preceding NP2, forming a prosodic constituent.
separate from NP1. The results of the present investigation indeed showed an effect of RC size. As predicted, in the sentences containing the shortest RCs (3–4 syllables long), a higher frequency of prosodic breaks after NP1 (44%) was found, as compared to the remaining two blocks of sentences (9.7% and 6%, respectively). Consequently, medium and long RCs showed, as predicted, an overwhelming preference for the prosodic boundary after NP2 (90.3% and 94%, respectively). We may conclude that although the insertion of a prosodic break after NP2 is the default prosodic contour in these structures in Spanish, constituent length and, specifically, length of the RC, influences prosodic segmentation. These results then support the prediction made by Fodor’s Same Size Sister Constraint. Also, the fact that a constituent length effect was found both for skimming and non-skimming participants suggests that constituent length influences prosodic phrasing when semantic information has been fully accessed as well as when it has not been.

The constituent length effect obtained in the present experiment converges with previous studies that examined non-ambiguous structures in Spanish, specifically declarative sentences with an SVO structure. Thus, D’Imperio et al. (2005) and Elordieta et al. (2005) showed that manipulating the length of the constituents (and consequently their prosodic heaviness) induced changes in the resulting prosodic phrasing of the sentences. Interestingly, only prosodic heaviness in terms of number of prosodic words, but not in terms of number of syllables, affected the phrasing of the sentences. In the present study, the length of the relative clause varied both in terms of number of syllables and number of prosodic words across conditions, and these two variables were not controlled for separately. Therefore, the present set of data does not allow us to disentangle whether the observed constituent length effect results from manipulation of the number of syllables of the RC, the number of prosodic words, or both. A future study is pending that might help us clarify the relative contribution of these two variables.

Lastly, the present investigation aimed to observe the potential influence of the participants’ familiarity with the sentences prior to reading them aloud and to examine whether accessing full semantic information of the sentences resulted in differences in prosodic phrasing. On the one hand, participants who skimmed the sentences produced a significantly lower number of utterances that contained either no strong boundaries or two equally strong boundaries within the critical region (21.4% as compared to 39.5% in non-skimming participants). On the other hand, skimming the sentences prior to reading them aloud significantly increased the frequency of occurrence of the default prosodic phrasing (i.e., break insertion after NP2). Thus, accessing the full semantic content of the sentences prior to reading them aloud resulted in a significantly higher frequency of occurrence of utterances that contained a single strong boundary within the critical region, which were typically realized with the
The higher frequency of occurrence of the default prosodic phrasing found in the skimming participants of the present investigation might result from the interaction between ambiguity resolution and a lexical feature, namely animacy, of the potential antecedents of the RC (i.e., NP1 and NP2), which has been reported in recent processing studies. Desmet et al. (2002, 2006) showed that animacy modulated the ambiguity resolution of these structures in Dutch. Thus, presence of an animate NP1 resulted in a significant preference for high attachment of the RC to NP1, regardless of whether NP2 was animate or inanimate. Manipulating animacy has also been found to modulate ambiguity resolution in Spanish (Acuña-Fariña et al. 2009) and European Portuguese (Soares et al. 2010), languages in which animate NP1s also attract attachment of the RC. Crucially, the sentences in the present study contained only animate NPs within the critical region, that is, all NP1s (and NP2s) were animate. Participants who skimmed the sentences might thus have parsed these ambiguous sentences attaching the RC to the NP1, a parsing strategy associated with the default prosodic phrasing described in the present study (namely, break insertion after NP2 [NP1 NP2/RC]), resulting in the observed increase in the default phrasing found in the skimming group.

The stimuli in Jun and Koike’s (2008) production study contained predominantly animate NPs within the critical region, but not exclusively so (Sun-Ah Jun, personal communication). Therefore, no conclusion can be drawn as to whether animacy played a role in the phrasing differences found between the skimming and non-skimming groups in Jun and Koike (2008), and between the skimming participants in Jun and Koike (2008) and the present investigation. So, further research seems necessary to fully understand the influence of the skimming variable.

5 Conclusions

The present investigation examined the default phrasing in Spanish of sentences that contain a relative clause with two potential noun phrase antecedents, that is, of [NP1 NP2 RC] structures. The results of the present investigation show a default
phrasing characterized by break insertion after NP2, a result that supports the claim that high attachment languages are characterized by a [NP1 NP2/RC] phrasing. The differences obtained in prosodic phrasing between native and non-native speakers of Spanish suggest that non-natives are not able to reach native-like prosody, notwithstanding their high proficiency and early acquisition of the second language. On the other hand, constituent length (specifically, length of the RC) and familiarity with the sentences influence the prosodic phrasing of sentences containing the target structure [NP1 NP2 RC], though these factors do not overrule the default patterns in the language. The observed effect of constituent length supports the predictions of Fodor’s (1998) Same Size Sister Constraint. The familiarity effect obtained, at odds with the one obtained in Jun and Koike (2008), might result from the influence of a lexical feature, namely animacy, and calls therefore for further research in order to fully determine the role of this feature.

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Appendix: Materials

Block 1: 3- to 4-syllable long RCs
1. María besó al amigo del niño que reía.
2. Alguien llevó al amigo del niño que lloraba.
3. Nadie habló al amigo del gamberro que vino.
4. Un hombre saludó al marido de la ganadora que lloró.
5. La explosión hirió a la hermana de la abogada que leía.
6. Mi jefe despidió a la amiga de la madrileña que bailaba.
7. Manuel amaba a la amiga del librero que emigró.
8. Mi amiga llamó al sobrino del hombre que navegó.
9. Mi madre invitó a la sobrina de la bailarina que bebía.
10. Mi hermana consoló a la hermana de la niña que miraba.
11. Hacienda investigó al hermano del senador que se mudó.
12. Nadie felicitó a la nuera del anciano que llegaba.

Block 2: 6- to 7-syllable long RCs
1. Elena vio al amigo del mendigo que era muy nervioso.
2. El profesor aprobó al amigo del noruego que era simpático.
3. Un ladrón robó al mayordomo del señor que llegaba a casa.
4. Mi madre saludó al amigo del señor que vino desde Suecia.
5. El hombre despidió al hermano del marinero que hablaba portugués.
6. Mi padre saludó a la hermana de la gallega que era muy modesta.
7. Ese ladrón engañó al amigo del barbero que vino desde Madrid.
8. El vecino saludó a la hermana del marinero que enfermaba mucho.
9. Nadie habló a la hermana de la profesora que leyó la novela.
10. La policía detuvo a la sobrina de la niñera que dio muchos problemas.
11. La secretaria llamó al sobrino del obrero que cumplió condena.
12. El periodista siguió al novio de la señora que ganó el concurso.

Block 3: 9- to 11-syllable long RCs
1. El ladrón robó al mayordomo del noble que llevaba un traje rojo nuevo.
2. María escribió al amigo del mesonero que de niño adoraba la pasta.
3. Pedro insultó a la novia del librero que bebía demasiado alcohol.
4. La mujer ayudó al manager del modelo que volaba a menudo a Madrid.
5. Mi hermana saludó al amigo del niño que ayudaba a poner la mesa.
6. El juez condenó al hermano del bailarín que vivió varios años en Francia.
7. Mi amigo saludó a la enfermera de la señora que bailaba todos los domingos.
8. Nadie salvaba al hermano del barbero que engañó a todos sus amigos.
9. El conductor atropelló al hermano del abogado que bebía demasiado vino.
10. Mi hermano llamó a la amiga de la niña que adoraba la hierba verde.
11. Ella amaba al hermano del vendedor que lideraba nuestro grupo.
12. Mi madre se lo regaló al alumno del hombre que vestía de marrón oscuro.

References


