

RC Attachment in Spanish

When materials are ambiguous, and method is untimed, Spanish speakers prefer **high** attachment interpretations of the relative clause (RC) in the example:

Andrés cenó con el **sobri**no del **maestro** que se emborrachó.
¿Quié **n** se emborrachó? el **sobri**no el **maestro**

*Andrew ate with the nephew of the teacher who self got-drunk(sg).
Who self got-drunk(sg)? the nephew the teacher*

When materials are disambiguated, and method is timed, a preference for high attachment is not always obtained. Means of disambiguation is one factor possibly behind variation in the data pattern:

- Semantics/Pragmatics: **high** (Cuetos & Mitchell, 1988)
- Gender Agreement: **high** (Carreiras & Clifton, 1993; Carreiras et al., 2001; but see De Vincenzi & Job, 1993 [Italian])
- Number Agreement: **low** (Carreiras et al., 2001, Fernández, 2000/2003; Miyamoto, 1999 [Portuguese]; but see Gibson et al., 1999)

Theoretical Objective

To refine existing explanations of the cross-linguistic differences in RC attachment

- An early preference for low attachment in Spanish (guided, e.g., by Late Closure), compared to the well-documented preference for high attachment obtained with untimed questionnaire tasks, would suggest that the cross-linguistic variation is sourced extra-syntactically, e.g., in language-specific pragmatic (Hemforth et al., submitted) or prosodic (Fodor, 2002) principles

Number Agreement

- No study in Spanish examines the full paradigm (but see Deevy, 1999 [English])
- Relevant background: within a clause, a plural intervening between a singular subject and the verb it must agree with (e.g., *the key to the cabinets was...*) disrupts processing (e.g., Bock & Miller, 1991; Bock et al., submitted; see also Vigliocco & Hartsuiker, 2002)
- With the RC attachment construction, perhaps disambiguating by number fails to produce a preference for high attachment in Spanish because a particular configuration of number in the complex NP may introduce an artifact: a plural N2 may disrupt processing when attachment is forced high to a singular N1, so: **is low preferred when mismatch in complex NP is N1sg-N2pl? and is high (or neither site) preferred when mismatch is N1pl-N2sg?**

Two Methods

Self-Paced Reading

- To replicate methods used in earlier studies (e.g., Cuetos & Mitchell, 1988)
- Potential liabilities: measure taken at end of sentence, so complicated by wrap-up effects; segmentation could induce interpretation bias

Same/Different Sentence Matching

- Permits participants to read whole sentences: no segmentation-induced effects
- Captures effects of grammaticality: "same" judgments are made faster on grammatical than ungrammatical stimuli (Murray, 1982; Stevenson, 1993)
- Potential liabilities: unclear how sensitive it is with the detection of syntactic anomalies caused by number agreement violations

Materials

N=32 target items in 4 versions

- Complex NP's number mismatch: **N1pl-N2sg** or **N1sg-N2pl**
- RC's attachment forced by number (at RC's verb): **High** or **Low**
- N1 & N2 both animate (N=16) or both inanimate (N=16)
- RC always short (1 prosodic word)

N=64 filler items, identical sentences across Expts. 1 & 2

- SPR: sentences followed by questions with unambiguously correct answers, position of answer (left, right) counterbalanced
- SDSM: "same" pairs (N=16 [+ 32 targets]); "different" pairs (N=48) differing in at most one word located early, in the middle, or late in the sentence

Andrés cenó con...

... los **sobri**nos del **maestro** que se emborracharon. ... el **sobri**no de los **maestros** que se emborrachó.
N1pl N2sg pl N1sg N2pl sg

... los **sobri**nos del **maestro** que se emborrachó. ... el **sobri**no de los **maestros** que se emborracharon.
N1pl N2sg sg N1sg N2pl pl

*Andrew ate with ...
... the nephew(s) of the teacher(s) who self got-drunk(sg/pl).*

Participants

- N=32 x 2 Spanish monolinguals, tested in Madrid, each pseudo-randomly assigned to one of 4 versions of self-paced reading (Expt. 1) or sentence matching (Expt. 2) task

Expt. 1: Self-Paced Reading

- Non-cumulative center-screen display
- Sentence in two frames, followed by question
- Accuracy feedback on Frame 3
- Analyses: 2 x 2 (x 4) ANOVAs
 - Frame 1, 2 and 3 reaction times
 - Cutoffs, affecting < 5% of dataset: ±2.00 SD, 500 ms, 7000 ms

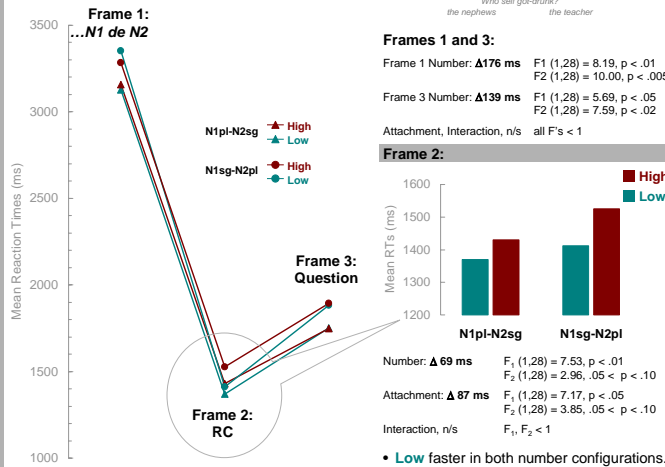
Sample Target (Fillers in identical format)

Frame 1: Andrés cenó con los sobrinos del maestro

Frame 2: que se emborracharon.

Frame 3: ¿Quié n se emborrachó? el maestro

*Andrew ate with the nephews of the teacher who self got-drunk?
the nephews the teacher*



Expt. 2: Same/Different Sentence Matching

- Response-contingent display (Stevenson, 1993)
- Accuracy feedback on Frame 2
- Analyses: 2 x 2 (x 4) ANOVAs
 - Frame 1 and 2 reaction times
 - Cutoffs, affecting < 5% of dataset: ±2.00 SD, 500 ms, 7000 ms

Sample Target ("Same" Fillers in identical format)

Frame 1: Andrés cenó con los sobrinos del maestro que se emborracharon.

Frame 2: Andrés cenó con los sobrinos del maestro que se emborracharon.

Frame 2: Andrés cenó con los sobrinos del maestro que se emborracharon.

Andrew ate with the nephews of the teacher who self got-drunk(pl).

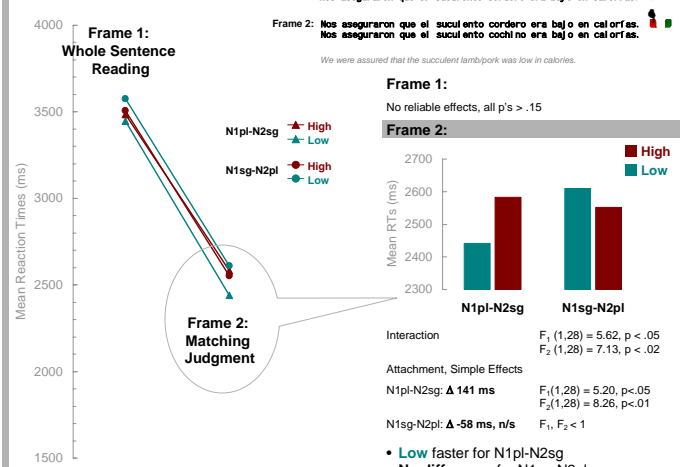
Sample "Different" Filler

Frame 1: Nos aseguraron que el succulento cordero era bajo en calorías.

Frame 2: Nos aseguraron que el succulento cordero era bajo en calorías.

Frame 2: Nos aseguraron que el succulento cochi no era bajo en calorías.

We were assured that the succulent lamb/pork was low in calories.



Summary

- Expts. 1 and 2 confirm an early preference for **low** attachment, when the number mismatch in the complex NP is **N1pl-N2sg**
- However, for **N1sg-N2-pl** materials, it is inconclusive what the preferred site is: either the **low** site (Expt. 1) or **neither** site (Expt. 2)
- Different configurations of number features provoke different degrees of processing difficulty: Expts. 1 and 2 converge on the finding that **N1sg-N2pl** sentences involve greater processing load than **N1pl-N2sg** sentences

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Early preferences in RC attachment in Spanish: Two methods, and disambiguation by number agreement

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In unspeeded questionnaire tasks probing the preferred interpretation of the relative clause (RC) in ambiguous strings like (1), high attachments are more frequent than low attachments, in Spanish (Cuetos & Mitchell, 1988, among others). The robustness of this finding contrasts with the discrepancies between experiments employing speeded measures (self-paced reading, eye-tracking). Some studies report faster reading times for forced-high (2a-b) over forced-low (2c-d) attachments (Cuetos & Mitchell, 1988; Carreiras & Clifton, 1993, 1999). But others observe the reverse pattern (Carreiras, Betancort & Meseguer, 2001; Fernández, 2000/2003), evidence that calls into question the assumption that Spanish attaches high at all phases of processing: Spanish might obey Late Closure in the initial parse, revising a low attachment if extra-syntactic information prompts it to do so.

Evidence of an early preference for forced-low in Spanish comes from studies where number agreement disambiguates attachment: one could argue that such a finding is artefactual and due to particular combinations of marked and unmarked number features interfering with "normal" processing. Within a clause, a plural intervening between a singular subject and the verb it must agree with (e.g., *the key to the cabinets was...*) disrupts processing (e.g., Bock & Miller, 1991). With RC attachment, the agreement relation is between clauses; nonetheless, a plural N2 might disrupt forcing attachment high in (2a) in ways that the singular N2 in (2b) may not.

In two experiments, Spanish monolinguals read identical target materials (N=32×4) crossing RC's attachment (low/high) and N2's number (singular/plural); see (2). In Experiment 1 (self-paced reading), targets were presented in two frames (segmentation as indicated by slashes), the critical measure coming from the second frame, where RC's attachment was disambiguated. In Experiment 2 (response-contingent same-different sentence-matching; Stevenson, 1993), having read a sentence presented by itself, participants pressed a button to make a second sentence appear directly beneath the first, at which point they made a judgment about whether the two sentences matched. (Target materials were always "same" pairs; distractors were either "same" or "different".) Experiment 2 provides two measures: an (uninteresting) whole-sentence reading time not necessarily sensitive to early processing effects, and a *matching time* that has been argued to reflect processing load associated with ungrammaticality detection in early phases of processing (Stevenson, 1993).

In both experiments, we observe a preference for forced-low attachments (2c-d) in the two measures assumed to be sensitive to early processing (RC reading times in Experiment 1; matching times in Experiment 2). This suggests that first-pass representations of the RC attachment construction are guided by Late Closure, even for a language where ultimate interpretations more frequently involve high attachments. Furthermore, in both experiments, sentences with plural N2s provoke substantially heavier processing load than those with singular N2s. The effect of N2's number does not interact with attachment in the RC reading time measure of Experiment 1. However, in the matching time measure of Experiment 2, the preference for forced-low is reliable when N2 is singular, but disappears when N2 is plural.

Examples

- (1) Andrés cenó con el sobrino del maestro que se emborrachó.
(Andrew ate with the nephew of the teacher who [refl] got-drunk[sg].)
- (2) Andrés cenó con...
(Andrew ate with...)
 - a. el sobrino de los maestros / que se emborrachó. [N1-sg N2-pl RCV-sg]
 - b. los sobrinos del maestro / que se emborracharon. [N1-pl N2-sg RCV-pl]
 - c. el sobrino de los maestros / que se emborracharon. [N1-sg N2-pl RCV-pl]
 - d. los sobrinos del maestro / que se emborrachó. [N1-pl N2-sg RCV-sg]

(... the nephew(s) of the teacher(s) / who [refl] got-drunk[sg/pl].)

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