A novel argument for the universality of attachment preference

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Asymmetries of attachment preferences for Relative Clauses (across languages and structures),

Previously unnoticed grammatical distinction: the availability of Pseudo-Relatives,

Hypothesis: once PRs are ruled out, Local Attachment is Universal,

Results from 3 novel experiments and from previous work support the hypothesis,

Concluding remarks
Asymmetries in RCs Attachment

Variation in attachment preferences with Relative Clauses (RCs) across languages, Cuetos & Mitchell (1988)

(1) a. Someone shot the maid₁ of the actress₂ that was standing on the balcony

b. Algúien disparó contra la criada₁ de la actriz₂ que estaba en el balcón
Asymmetries in RC Attachment

Variation in attachment preferences with Relative Clauses (RCs) across syntactic structures:

Several syntactic (type of P, position of complex NP, Nominal vs. Clausal context) and prosodic (length of RC, lengthening of tonic syllable in NP2, duration of prosodic breaks) factors have been shown to influence attachment.
Asymmetries in attachment preference

These findings at odds with uniform LOCAL / low attachment preference found for other structures in the same languages (e.g. PPs) i.e. strength of local attachment (Phillips & Gibson, 1997).

They lead to question the universality of parsing principles, in particular of Right Association (Kimball, 1973) / Late Closure (Frazier, 1978) / Recency (Gibson, 1991) / Merge Right (Phillips, 1996);

They pose serious problems to theories of acquisition and processing (Fodor, 1998a,b);
Several accounts have been proposed to explain these variations, e.g. the *Tuning Hypothesis* (Brysbaert & Mitchell, 1996), *Construal* (Gilboy et al., 1995; Frazier & Clifton, 1996), *Predicate Proximity* (Gibson et al., 1996), *Anaphoric Binding* (Hemforth et al., 1998, 2000b,a; Konieczny & Hemforth, 2000), *Implicit Prosody* (Fodor, 1998a,b) we will not discuss them here (see Fernández, 2003; Augurzky, 2005, for discussion).

Our main goal is to show the relevance of a previously unnoticed grammatical factor, which might be held responsible for attachment asymmetries both within and across languages.
Implicit Assumption in Literature

English \textit{that} = Spanish \textit{que} = Italian \textit{che} = Dutch \textit{die} etc.

Assuming identity at the grammatical level put all burden for the explanation of variation on parsing
Implicit Assumption . . . is wrong

English *that* $\neq$ Spanish *que* $\neq$ Italian *che* $\neq$ Dutch *die* etc.

One way in which Cs differ across languages is in whether they allow Pseudo Relatives, and if so, what variety (complement vs. adjunct PRs).
Pseudo Relatives

(2) a. ✓Ho visto Gianni che correva / Ho colpito Gianni che correva
*I saw John that ran / *I hit John that ran
I saw John running / I hit John while he was running

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Universal Parsing
Pseudo Relatives and Small Clauses

(3) COMPLEMENT SMALL CLAUSES
Non sopporto Gianni e Mario [vestiti così / that smoke in my house]
I can’t stand Gianni and Mario [dressed like that / *that smoke in my house]

(4) ADJUNCT SMALL CLAUSES
Gianni lasciò la stanza [ubriaco / che era ancora sotto lefetto dell’alcohol]
Gianni left the room [drunk / * that was still under the effects of alcohol]
A few distinctions between PR and RCs

<table>
<thead>
<tr>
<th>Property</th>
<th>RCs</th>
<th>PRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refers to individuals</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Available w. objects</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Available w. Rel. Pronouns</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>NP modifier</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Available w. Proper Names</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Available in SC environments</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>VP modifier</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Aspectual restrictions</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Refers to propositions</td>
<td>✗</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table: RCs and PRs
PR reading, illusion of High Attachment

(5)

\[ V' \]

\[ V \quad \text{SC} \]

\[ NP_1 \]

\[ \text{the son}_i \quad \text{PP} \quad \text{of} \quad \text{DP}_2 \]

\[ \text{the doctor}_j \]

\[ CP \]

\[ \text{that PRO}_{i,*j} \text{ ran} \]

→ WITHPRS, DP2 IS NOT AN ACCESSIBLE SUBJECT

→ \( V \) TAKES SC, AND NOT DP AS ARGUMENT OR ADJUNCT.
Variable Syntax, Uniform Parsing

1. Variation in Attachment Preferences, both across and within languages, reduces to the availability of PRs:

2. When PRs are available, everything else being equal, they will be preferred over RCs because of Minimal Attachment, PRs require fewer nodes than RCs.

3. When PRs are projected, “High Attachment” (i.e. attachment to DP1) is forced.

4. Corollary:
   - All attachment is local (PRs attach locally to closest VP)
   - Right Attachment/Late Closure/Recency are universal parsing principles
Further Predictions

1. Universal Low Attachment with genuine restrictive RCs,
2. High Attachment whenever PRs are available,
3. High Attachment with Acc-ing construction in English (*I saw the son of the doctor running*) and Prepositional Infinitive Constructions (PIC) in Portuguese (*vi o filho do medico a correr*), i.e. string ambiguous between reduced RCs and correlates of PR.
Explaining variation across languages

<table>
<thead>
<tr>
<th>Language</th>
<th>Attachment</th>
<th>PRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Low</td>
<td>X</td>
</tr>
<tr>
<td>German</td>
<td>Low(^1)</td>
<td>X</td>
</tr>
<tr>
<td>Romanian</td>
<td>Low</td>
<td>X</td>
</tr>
<tr>
<td>Basque</td>
<td>Low</td>
<td>X</td>
</tr>
<tr>
<td>Russian (?)</td>
<td>High</td>
<td>X</td>
</tr>
<tr>
<td>Portuguese</td>
<td>Variation</td>
<td>Variation</td>
</tr>
<tr>
<td>Galician</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Dutch</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Bulgarian</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>French</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Serbo-Croatian</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Japanese</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Korean</td>
<td>High</td>
<td>✓</td>
</tr>
<tr>
<td>Greek</td>
<td>High</td>
<td>✓</td>
</tr>
</tbody>
</table>

1Augurzky 2005, but see also Hemforth et al. 2000b,a

Table: Attachment Preferences and PR availability
Low Attachment Across Structures

(6) SUBJECTS (Hemforth et al., submitted)

a. The maid$_1$ of the actress$_2$ that was$_2$ on the balcony is blonde

b. La criada$_1$ de la actriz$_2$ que estaba$_2$ en el balcón es rubia
Low Attachment Across Structures

(7) NOMINALS

a. The lamp$_1$ near the painting$_2$ of the house$_3$
   that was$_2$ damaged by the flood

b. la lámpara$_1$ cerca de la pintura$_2$ de la casa$_2$
   que fué$_2$ dañada en la inundación

Gibson et al. (1996)
Low Attachment Across Structures

\[ (8) \quad \text{P TYPE} \quad \text{(De Vincenzi \& Job, 1993)} \]

a. Qualcuno ha sparato alla governante\textsubscript{1} con l’attrice\textsubscript{2} che stava\textsubscript{2} seduta in balcone

b. Someone shot the maid\textsubscript{1} with the actress\textsubscript{2} (that was) sitting\textsubscript{2} on the balcony
Low Attachment Across Structures

(9) RELATIVE PRONOUNS (Fernández, 2003)
Vi al hijo₁ del médico₂ el cual₂ estaba en el balcón
I saw the son₁ of the doctor₂
who[rel pron]₂ was on the balcony
Means to obtain Low Attachment

We manipulated the availability of PRs, forcing RC reading, using the following restrictions:

- subject extraction
- position of complex NP: Right Branching, Center Embedding;
- type of main verb: event vs. state-introducing Vs and Ns.
Experiment 1: Materials and Design

Questionnaire (N=30)

- 2x2 crossing position (right branching vs. center embedding) and ExtractionSite (subject vs. object)
- 20 sets of target sentences (4 versions each)
- 80 fillers
- Counterbalanced materials (each subject only sees one version of each sentence)
- PC using Linger software developed by Doug Rodhe (http://tedlab.mit.edu/dr/Linger) OR presented on Excel spreadsheet.
- Comprehension questions following EACH sentence
Experiment 1: Stimuli

(10) a. *right branching subject extraction*
   il dottore ha chiamato il figlio del signore che veniva attaccato dai poliziotti

b. *right branching object extraction*
   Il dottore ha chiamato il figlio del signore che i poliziotti avevano attaccato

c. *center embedded subject extraction*
   il figlio del signore che che veniva attaccato dai poliziotti ha superato la prova

d. *center embedded object extraction*
   il figlio del signore che i poliziotti avevano attaccato ha superato la prova
   chi era attaccato? A. figlio B. signore
Experiment 1: Results

<table>
<thead>
<tr>
<th></th>
<th>RB</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Object</td>
<td>33%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Table: Percentage of High Attachment Preferences

- Mixed Model Regression analysis in open-source code R with the lme4 library (Bates and Sarkar, 2007)
- Significant effect of position (t value = 4.447): more High Attachment for RB than CE.
- Significant interaction between position and extractionsite (t value = -2.641): more High Attachment for subject extraction than object extraction IN RB only!
Experiment 2: Materials and Design

Questionnaire, (N=13): 2x2 crossing Type (PR and noPR) and Position (RB vs. CE). 24 sets of target sentences (4 versions each), 80 fillers.
Experiment 2: Stimuli

(11) **Stimuli**

a. *PR complement, Right Branching*
   O João viu o filho do medico que estava a correr
   John saw the son of the doctor that was running

b. *noPR, Center Embedding*
   A foto do filho do medico que estava a correr é muito linda
   The picture of the son of the doctor that was running is very nice

c. *noPR, Right Branching*
   O João vive com o filho do medico que estava a correr
   John lives with the son of the doctor that was running

d. *noPR, Center Embedding*
   A moto do filho do medico que estava a correr é muito linda
   The motorbike of the son of the doctor that ran is very nice

A. o filho corre  
B. o medico corre
Experiment 2: Results

<table>
<thead>
<tr>
<th></th>
<th>RB</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR</td>
<td>70.5%</td>
<td>48.7%</td>
</tr>
<tr>
<td>no PR</td>
<td>47.4%</td>
<td>37.1%</td>
</tr>
</tbody>
</table>

Table: Percentage of High Attachment Preferences

- Significant effect of type ($t$ value $= 3.147$): High Attachment in PR $>$ noPR.
- Significant effect of position ($t$ value $= -4.008$): more High Attachment for RB than CE.
Beyond PR: SCs and attachment

Same method, procedure and (adapted) stimuli from previous experiment, 20 Portuguese native speakers participated in the experiment.
With PIC, we expect High Attachment to emerge also in subject position, but ONLY with “picture of- NPs”, i.e. NPs that can select for events.
Experiment 3: Stimuli

(12) Stimuli

a. *SC complement, Right Branching*
   O João viu o filho do medico a correr
   John saw the son of the doctor running

b. *SC adjunct, Center Embedding*
   A foto do filho do medico a correr é muito linda
   The picture of the son of the doctor running is very nice

c. *noSC, Right Branching*
   O João vive com o filho do medico a correr
   John lives with the son of the doctor running

d. *noSC, Center Embedding*
   A moto do filho do medico a correr é muito linda
   The motorbike of the son of the doctor running is very nice

A. o filho corre
B. o medico corre
Experiment 3: Results

<table>
<thead>
<tr>
<th></th>
<th>RB</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td>72.9.6%</td>
<td>69.7%</td>
</tr>
<tr>
<td>noSC</td>
<td>37.8%</td>
<td>49.1%</td>
</tr>
</tbody>
</table>

Table: Percentage of High Attachment Preferences

- Significant effect of type (t value = 6.65): High Attachment in SC > noSC.
- Significant type*position interaction (t value = -2.05): more High Attachment for RB than CE
Discussion

→ High attachment preference is observed only when PRs are available, i.e. limited to subject extraction in RB cases.

→ Low attachment preference in all other conditions in which PRs are unavailable (object extraction in RB and both subject and object extraction in CE)
We have shown, on the basis of both previous and original results that PRs availability modulates attachment both across languages and syntactic structures.

Speakers of those languages that allow for PRs in the relevant contexts have been reported to prefer High Attachment, while speakers of languages that disallow PRs in those same contexts prefer Low Attachment.
Moreover, within the same language, whenever PRs are not available, uniform Low Attachment preference emerges.

On these bases we have argued that once PRs are taken into the equation, the Universality of Parsing principles of locality can be stated once again.
Thank you!
Acknowledgements

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Appendix - Future Tasks

**Theoretical**: Thorough comparison of PRs availability across languages and structures. A few issues include the following:

- How similar/different are romance PRs from e.g. Japanese / Korean perceptual constructions?
- What are the semantic and syntactic bases for these distinctions?
- What
Appendix - Future Tasks

Experimental:

- Continue with careful examination literature (Chinese, Hebrew, Arabic etc.) and problematic cases: e.g. *Russian*, *German*.
- Systematically manipulate PRs availability in different languages using e.g.:
  - Tense mismatch,
  - Modals *Ho visto il figlio del medico che poteva correre (NO PR) / I saw the son of the doctor that could run*,
  - Relative Pronouns,
  - *what I saw is x that ... vs. who I saw ...* contexts,
  - *que vs. qui* in French,
  - Matrix verb type in Japanese and Korean, e.g. *catch (IHRC) vs. see (perceptual construction).*
PRs and Prosody

- PRs have a special prosody, just like SCs
  John saw / Mary running by herself vs.
  #John saw / Mary running by himself

- To what extent previous results testing prosody effects might have been influenced by the manipulation of PRs? Ho visto Mario che correva (PR) / era corso a casa (NO PR).


